QUICK START GUIDE

PARAMETER LIST

USA units

FP (E) FEP-14 / iSE(P) RCF **REFR/COOL**
***FrigoSoft* 1.6**

FS 1.6.2-2x

SPORLAN KIMO Refrigeration HVAC

Automatic to OPERATOR menu approx. 2 s after switching on

`FrigoSoft16.2_2a XXXT4-6 1.3x` ⇄ `OPERATOR menu at level 1`

	Type / Value	Description	Further information
`03:pe____pc PRES Y.Y YY.Y bar`	Measured values	Compressor rack: Evaporating and condensing pressure	9.1.1
`04:pe____pc P DV Y.Y Y.Y%`	Deviations	Compressor rack: Evaporating and condensing pressure	
`07:VsC ELEC A_Hz Y.Y Y.Y Hz`	Measured values	Variable-speed Compressor: Motor current, Motor frequency	9.1.2
`08:FsC ACTV_POSS Y Y`	Measured values	Fixed-speed Compressors: Number active / possible	9.1.1
`15:VsF CD ACT VL YYY.Y %`	Measured values	Variable speed Fan, cond.: 0.00 ... 100.00 (%)	9.1.3

Measured values
- *Compressor rack:*
- *Variable-speed Compressor (VsC):*
- *Fixed-speed Compressor (FsC):*
- *Variable-speed Fans (VsF), Condenser:*

Settings

Compressor rack
- *Suction pressure:*
- *Discharge / condensing pressure:*

			Type / Value	Description	Further information
36.3 psig	`30:pe MINIMUM → 2.5 bar`	- 16 °C*	Limit value _._ bar	pe, Stop value "Pump Down limit": -0.5 ... 7.0 bar	8.3.2
47.9 psig	`33:pe SETPOINT → 3.3 bar`	- 10 °C*	Setting 1 _._ bar	pe, Setpoint: -0.5 ... 7.0 bar	
87.0 psig	`39:pe MAXIMUM → 6.0 bar`	7 °C*	Limit value _._ bar	pe, Maximum value: -0.5 ... 7.0 bar	
251 psig	`43:pc SETPOINT → 17.3 bar`	40 °C*	Setting 1 _._ bar	pc, Setpoint: 0.0 ... 30.0 bar	8.3.4
336 psig	`49:pc MAXIMUM → 23.0 bar`	51 °C*	Limit value _._ bar	pc, High Limit: 0.0 ... 30.0 bar	

Variable-speed Compressor (VsC)
- *Frequency range:*
- *Resonance avoidance:*
- *Time settings:*
- *Lubrication:*

	Type / Value	Description	Further information
`61:VsC CURR MAX → FFF.FF A`	Limit value ___._ A	VsC, Maximum current: 0.00 ... 999.99 A	8.4.1
`62:VsC FREQ MAX → 60.0 Hz`	Limit value __._ Hz	VsC, Maximum frequency: 15.0 ... 90.0 Hz	
`65:VsC FREQ MIN → 25.0 Hz`	Limit value __._ Hz	VsC, Minimum frequency: 15.0 ... 90.0 Hz	
`66:VsC SKIP FREQ → 0.0 Hz`	Setting __._ Hz	VsC, Skip frequency: 15.0 ... 90.0 Hz	8.4.2
`67:VsC SKIP BAND → 0.0 Hz`	Setting __._ Hz	VsC, Skip frequency band: 0.0 ... 10.0 Hz	
`70:VsC tinh TIME → FFF.F s`	Limit value ___._ s	VsC, Minimum OFF time: 0.1 ... 3000.0 s	8.4.3
`71:VsC thld TIME → 10.0 s`	Setting __._ s	VsC, Hold time (time at fmin following oil pulse): 0.1 ... 3000.0 s	
`74:VsC tmon fmin → 600.0 s`	Setting __._ s	VsC: Monitoring time at fmin: 0.0 ... 3000.0 s	
`76:VsC toil STRT → 4.0 s`	Setting __._ s	VsC, Oil lubrication pulse time: 0.1 ... 3000.0 s	8.4.4

Fixed-speed Compressor (FsC)
- *Time settings*
- *Rack design:*

`81:FsC ton DLY → FFF.0 s`	Setting ___._ s	FsC, Switch-on delay: 0.1 ... 3000.0 s	8.5.1
`82:FsC toff DLY → FF.0 s`	Setting __._ s	FsC, Switch-off delay: 0.1 ... 3000.0 s	
`83:FsC NUMBER → 1`	Selection _	FsC, Number of compressors: 0 ... 2	

Controllers
- *pe Controller:*
- *pc Controller:*
- *VsF Minimum speed:*

`91:pe CNTRL P-GN → F.00`	Setting _._	pe controller, Proportional gain: 0.10 ... 100.00	8.6.1
`92:pc CNTRL P-GN → 10.0`	Setting _._	pc controller, Proportional gain: 0.1 ... 100.0	8.6.2
`93:VsF CD MIN SD → 15.00`	Setting __._ %	Var.-speed Fan, cond., min. speed: 0.00 ... 100.00	

Other settings

`A1:AOUT1 FUNCTN → INPUT 0`	Selection _	AOUT1 - Function selection: INPUT 0...3 (VsF)	8.7.1
`A4:DOUT1 FUNCTN → INPUT 2`	Selection _	DOUT1 - Function selection: INPUT 0...7 (CC)	
`A5:DOUT3 FUNCTN → INPUT 0`	Selection _	DOUT3 - Function selection: INPUT 0...7 (FsC1)	
`A9:LANGUAGE → ENGLISH`	Selection _____	Language selection: ENGLISH ... NEDERLANDS	8.7.3

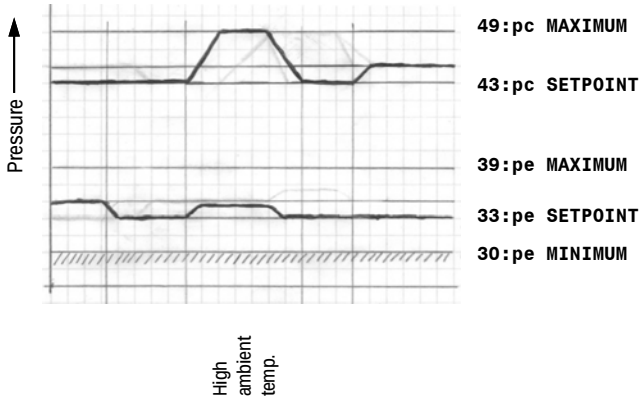
* Factory setting for R404A

Key for abbreviations
VsC: Variable-speed Compressor
FsC: Fixed-speed Compressor
VsF: Variable-speed fans (Condenser / Dry cooler)

= YYY.YY % : Measured value depending on operating point
→ FFF.0 s : Factory default value depending on frame size and rated power

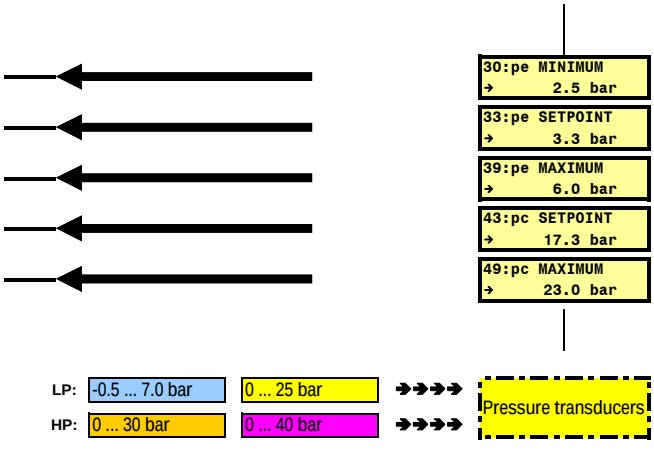
FIRST TIME POWER UP: Go to page 11

Explanation of adjustable operating pressures:



Suggested refrigeration settings:

Based on EN 12900

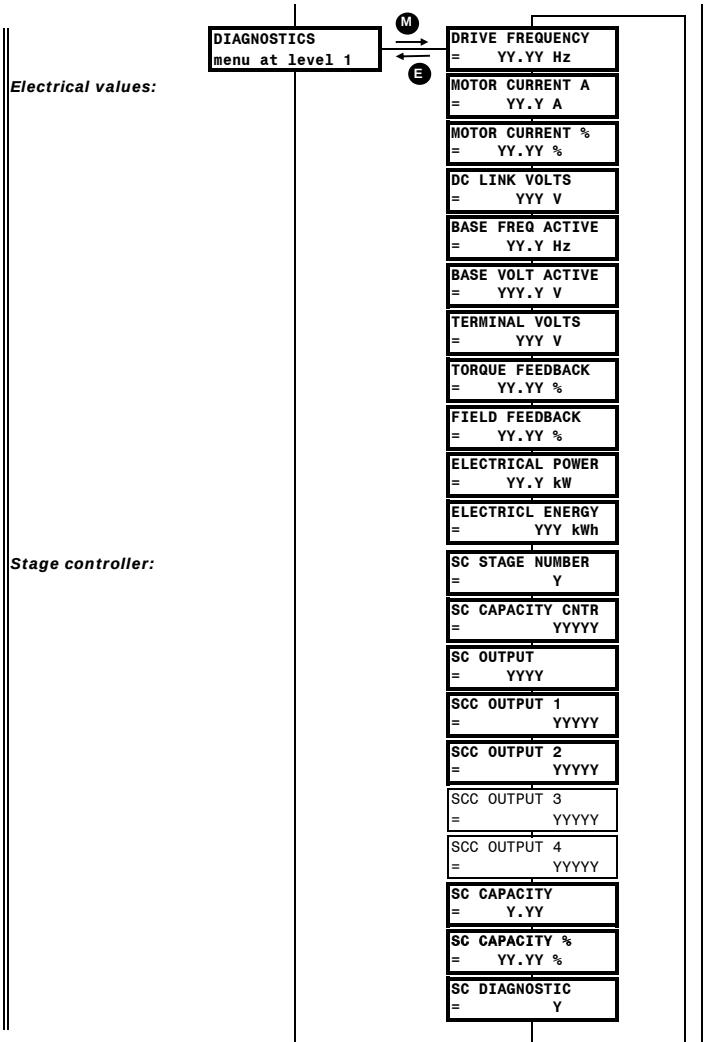


Factory setting

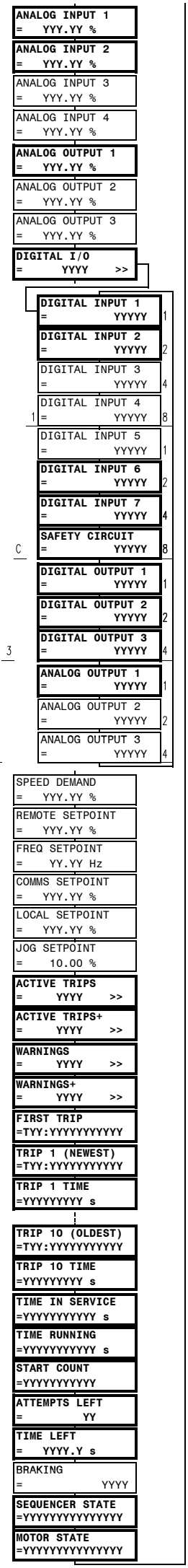
R404A / R507			R407C		R22			R134a		R410A	
LT	MT	HT	MT	HT	LT	MT	HT	MT	HT	MT	HT
-40 °C/ 0.3	-16 °C/ 2.5	0 °C/ 5.0	-16 °C/ 1.5	0 °C/ 3.6	-37 °C/ 0.2	-16 °C/ 1.9	0 °C/ 4.0	-16 °C/ 0.6	0 °C/ 1.9	-16 °C/ 3.6	0 °C/ 7.0
-35 °C/ 0.6	-10 °C/ 3.3	5 °C/ 6.0	-10 °C/ 2.2	5 °C/ 4.5	-32 °C/ 0.5	-10 °C/ 2.6	5 °C/ 4.8	-10 °C/ 1.0	5 °C/ 2.5	-10 °C/ 4.7	5 °C/ 8.3
5 °C/ 6.0	5 °C/ 6.0	5 °C/ 6.0	10 °C/ 5.5	10 °C/ 5.5	10 °C/ 6.8	10 °C/ 6.8	10 °C/ 6.8	12 °C/ 3.4	12 °C/ 3.4	12 °C/ 10.5	12 °C/ 10.5
40.. °C/ 17.3	40.. °C/ 17.3	40.. °C/ 17.3	40.. °C/ 16.5	40.. °C/ 16.5	40.. °C/ 14.3	40.. °C/ 14.3	40.. °C/ 14.3	40.. °C/ 9.2	40.. °C/ 9.2	40.. °C/ 23.3	40.. °C/ 23.3
52 °C/ 23.0	52 °C/ 23.0	52 °C/ 23.0	52 °C/ 22.2	52 °C/ 22.2	52 °C/ 19.3	52 °C/ 19.3	52 °C/ 19.3	55 °C/ 13.9	55 °C/ 13.9	55 °C/ 37.4	55 °C/ 37.4
R404A/R507			R407C		R22			R134a		R410A	
		*									*
										*	*

* Modified settings required, see Special Settings, page 4

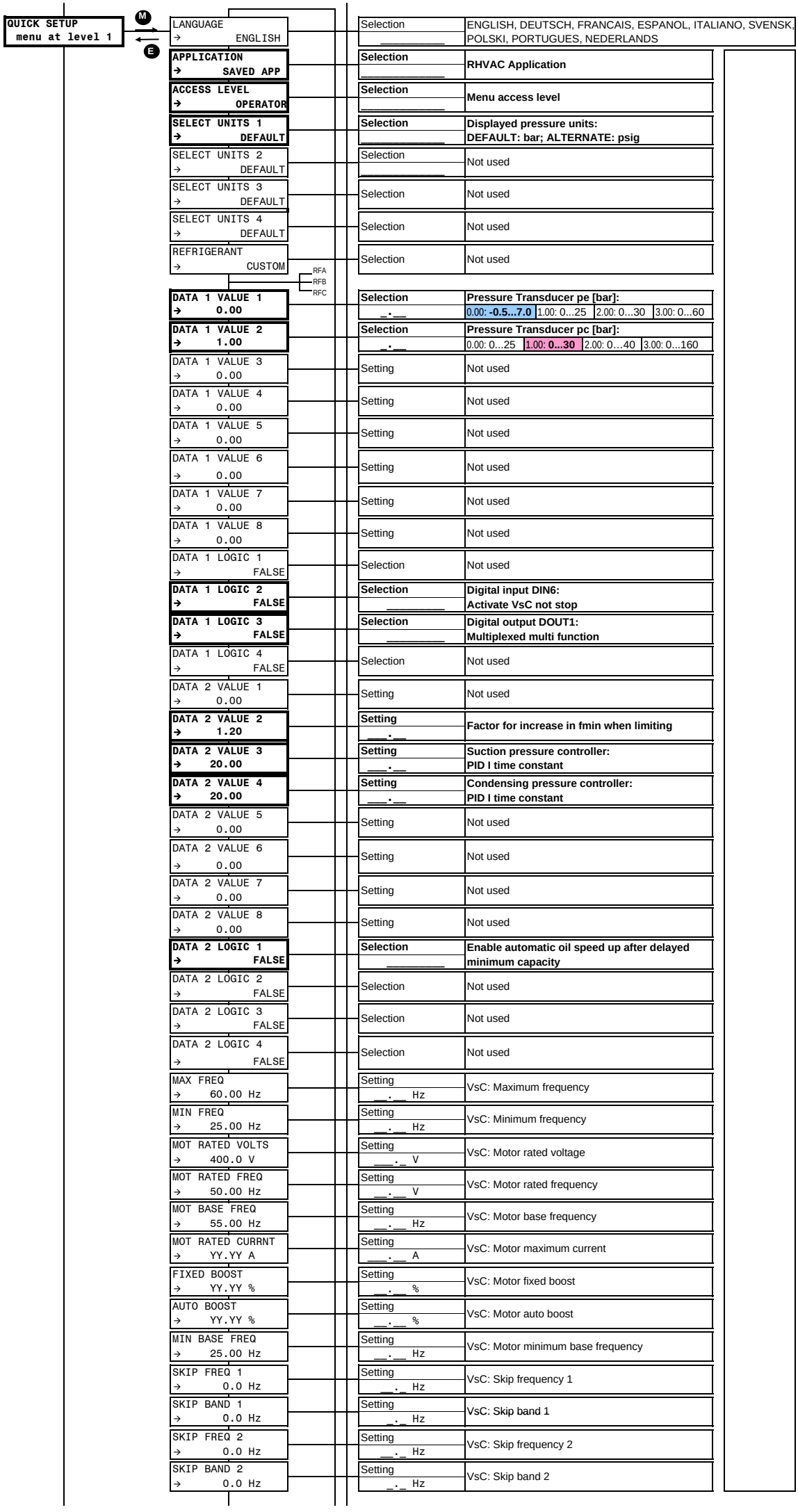
Diagnostics



Internal value	Variable-speed Compressor: Motor Frequency	9.2.1
Measured value	Variable-speed Compressor: Motor current [A]	
Internal value	Variable-speed Compressor: Motor current [%]	
Measured value	Variable-speed Compressor: DC link voltage	
Internal value	Variable-speed Compressor: Active base frequency	
Internal value	Variable-speed Compressor: Active base voltage	
Measured value	Variable-speed Compressor: Motor voltage	
Internal value	Variable-speed Compressor: Calculated torque	
Internal value	Variable-speed Compressor: Calculated magnetic motor field	
Measured value	Variable-speed Compressor / Rack: Calculated / Measured electrical power	
Measured value	Variable-speed Compressor / Rack: Calculated / Measured electrical energy	
Internal value	Compressor rack: Number of stages	9.2.2
Command	Compressor rack: Capacity Control activated	
Internal value	Compressor rack: Output control signal	
Command	Compressor rack: Output control signal 1	
Command	Compressor rack: Output control signal 2	
Internal value	Not in use	
Internal value	Not in use	
Internal value	Compressor rack: Calculated total power	
Internal value	Compressor rack: Calculated total power in %	
Internal value	Compressor rack: Diagnostics	



AIN1 (X2:2) Analog input 1	**pe, Suction-pressure transducer:** **4 ... 20 mA; 0.0 ... 100.0 %**	**6.3.1 /**
AIN2 (X2:3) Analog input 2	**pc, High-pressure transducer:** **4 ... 20 mA; 0.0 ... 100.0 %**	
Analog input 3	Not used	
Digital input 3	Not used	
AOUT1 (X2:6) Analog output 1	**VsF speed / VsC speed /** **- / -**	**6.3.2**
Analog output 2	Not used	
Analog output 3	Not used	
Menü	**Digital inputs and outputs**	**5.2**
DIN1 (X2:12) Digital input 1	**Enable (Start)**	**5.2.1-4**
DIN2 (X2:13) Digital input 2	**Force lubrication speed**	**5.3**
DIN3 (X2:14) Digital input 3	Not used	
DIN4 (X2:15) Digital input 4	Not used	
DIN5 (X2:16) Digital input 5	Not used	
DIN6 (X2:17) Digital input 6	**FsC Safety circuits without fault /** **Activate VsC continuous operation**	**5.3**
DIN7 (X2:18) Digital input 7	**Activate emergency operation**	**5.3**
DIN8 (X2:19) Digital input 8	**Safety circuit "Ready" (No fault)**	**5.4**
DOUT1 (X:21-22) Digital output 1	**Ready (Health)**	**6.3.4**
DOUT2 (X2:23-24) Digital output 2	**Operating**	**6.3.4**
DOUT3 (X2:25-26) Digital output 3	**Activate FsC1** **(Fixed-speed Compressor 1)**	**6.3.4**
AOUT1 (X2:6) Analog output 1	**- / - /** **- / No pc limiting**	**6.3.2**
AOUT2 (X3:7A-7B) Digital output A2	Not used	**6.3.4**
AOUT3 (X3:8A-8B) Digital output A3	Not used	**6.3.4**
Internal value	VsC: Actuating value of Freq.: % of maximum frequency	**8.1.13**
Internal value	Remote setpoint: % of maximum frequency	
Internal value	VsC Frequency Setpoint: Frequency	
Internal value	Comms command setpoint: % of maximum frequency	
Internal value	Local setpoint: % of maximum frequency	
Internal value	Jog setpoint: % of maximum frequency	
Trips	**Active trips:** **First set**	**10.2-4**
Trips	**Active trips:** **Second set**	
Warning	**Warnings:** **First set**	
Warning	**Warnings:** **Second set**	
Trip	**Trip which caused shut down**	
Trip	**Trip 1 (newest) which caused shut down**	
Trip	**Time trip 1 occured**	
Trip	**Trip 10 (oldest) which caused shut down**	
Trip	**Time trip 10 occured**	
Measured value	**Time powered up**	**10.2-4**
Measured value	**Time VsC running**	
Measured value	**Number of VsC starts**	
Internal value	**Autorestart logic:** **Attempts left**	
Internal value	**Autorestart logic:** **Time to next start attempt**	
Status	iSpeed: Chopper active	
Status	**iSpeed operating status:** **Sequencer control state**	
Status	**VsC operating status:** **Sequencer control state**	


QUICK SETUP
menu at level 1
M
E
LANGUAGE → ENGLISH
Selection _____ ENGLISH, DEUTSCH, FRANCAIS, ESPANOL, ITALIANO, SVENSK, POLSKI, PORTUGUES, NEDERLANDS
Basic settings:
APPLICATION → SAVED APP
Selection _____ RHVAC Application
ACCESS LEVEL → OPERATOR
Selection _____ Menu access level
SELECT UNITS 1 → DEFAULT
Selection _____ Displayed pressure units: DEFAULT: bar; ALTERNATE: psig
SELECT UNITS 2 → DEFAULT
Selection _____ Not used
SELECT UNITS 3 → DEFAULT
Selection Not used
SELECT UNITS 4 → DEFAULT
Selection Not used
REFRIGERANT → CUSTOM
Selection Not used
RFA
RFB
RFC
Special settings:
DATA 1 VALUE 1 → 0.00
Selection _._ Pressure Transducer pe [bar]: 0.00: -0.5...7.0 | 1.00: 0...25 | 2.00: 0...30 | 3.00: 0...60
DATA 1 VALUE 2 → 1.00
Selection _._ Pressure Transducer pc [bar]: 0.00: 0...25 | 1.00: 0...30 | 2.00: 0...40 | 3.00: 0...160
DATA 1 VALUE 3 → 0.00
Setting Not used
DATA 1 VALUE 4 → 0.00
Setting Not used
DATA 1 VALUE 5 → 0.00
Setting Not used
DATA 1 VALUE 6 → 0.00
Setting Not used
DATA 1 VALUE 7 → 0.00
Setting Not used
DATA 1 VALUE 8 → 0.00
Setting Not used
DATA 1 LOGIC 1 → FALSE
Selection Not used
DATA 1 LOGIC 2 → FALSE
Selection _____ Digital input DIN6: Activate VsC not stop
DATA 1 LOGIC 3 → FALSE
Selection _____ Digital output DOUT1: Multiplexed multi function
DATA 1 LOGIC 4 → FALSE
Selection Not used
DATA 2 VALUE 1 → 0.00
Setting Not used
DATA 2 VALUE 2 → 1.20
Setting ___._ Factor for increase in fmin when limiting
DATA 2 VALUE 3 → 20.00
Setting ___._ Suction pressure controller: PID I time constant
DATA 2 VALUE 4 → 20.00
Setting ___._ Condensing pressure controller: PID I time constant
DATA 2 VALUE 5 → 0.00
Setting Not used
DATA 2 VALUE 6 → 0.00
Setting Not used
DATA 2 VALUE 7 → 0.00
Setting Not used
DATA 2 VALUE 8 → 0.00
Setting Not used
DATA 2 LOGIC 1 → FALSE
Selection _____ Enable automatic oil speed up after delayed minimum capacity
DATA 2 LOGIC 2 → FALSE
Selection Not used
DATA 2 LOGIC 3 → FALSE
Selection Not used
DATA 2 LOGIC 4 → FALSE
Selection Not used
VsC motor settings:
MAX FREQ → 60.00 Hz
Setting __._ Hz VsC: Maximum frequency
MIN FREQ → 25.00 Hz
Setting __._ Hz VsC: Minimum frequency
MOT RATED VOLTS → 400.0 V
Setting ___._ V VsC: Motor rated voltage
MOT RATED FREQ → 50.00 Hz
Setting __._ V VsC: Motor rated frequency
MOT BASE FREQ → 55.00 Hz
Setting __._ Hz VsC: Motor base frequency
MOT RATED CURRNT → YY.YY A
Setting ___._ A VsC: Motor maximum current
FIXED BOOST → YY.YY %
Setting __._ % VsC: Motor fixed boost
AUTO BOOST → YY.YY %
Setting __._ % VsC: Motor auto boost
MIN BASE FREQ → 25.00 Hz
Setting __._ Hz VsC: Motor minimum base frequency
SKIP FREQ 1 → 0.0 Hz
Setting __._ Hz VsC: Skip frequency 1
SKIP BAND 1 → 0.0 Hz
Setting _._ Hz VsC: Skip band 1
SKIP FREQ 2 → 0.0 Hz
Setting __._ Hz VsC: Skip frequency 2
SKIP BAND 2 → 0.0 Hz
Setting _._ Hz VsC: Skip band 2

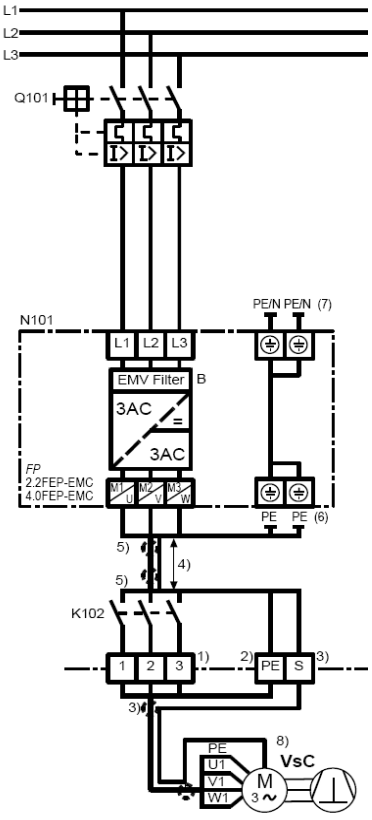
Energy meter:	ENERGY MET RESET → FALSE	Selection _____	Energy meter: Reset at FALSE --> TRUE --> FALSE
	ENERGY MET MODE → INTERNAL	Selection _____	Energy meter: Mode: Internal= VsC; External= Rack
	ENERGY MET SCALE → 1.0 kW	Setting __._ kW	Energy meter: Scale: 1 kWh each pulse
Serial communications:	P3 EI ASCII UID → 1	Setting _	P3 RS232 port with EI ASCII protocoll: Unit Identifier address
	MDBS RTU ADDRESS → 0	Setting _	Not in use
	MDBS RTU PARITY → 0	Selection _____	Not in use
Analog input types:	AIN 1 TYPE → 4..20 mA	Selection _____	Analog input AIN1: Type
	AIN 2 TYPE → 4..20 mA	Selection _____	Analog input AIN2: Type
	AIN 3 TYPE → 0..+10 V	Selection	Not in use
	AIN 4 TYPE → 0..+10 V	Selection	Not in use
Compressor rack:	SC FsD+ DELAY → FFF s	Setting ___ s	Stage controller: FsC switch-on delay
	SC FsD+ FORCE → FALSE	**Selection** _____	**Stage controller, Manual force: One stage more at FALSE>TRUE>FALSE**
	SC FsD- DELAY → FF s	Setting ___ s	Stage controller: FsC OFF delay
	SC FsD- FORCE → FALSE	**Selection** _____	**Stage controller, Manual force: One stage less at FALSE>TRUE>FALSE**
	SC FsD RUN MAX → 6000 s	Setting ____ s	Stage controller: FsC maximum run time
	SC FsD RUN MIN → 60 s	Setting ___ s	Stage controller: FsC minimum run time
	SC FsD STOP MAX → 600 s	Setting ____ s	Stage controller: FsC maximum stop time
	SC FsD STOP MIN → 60 s	Setting ___ s	Stage controller: FsC minimum stop time
	SC CC ACTIVE MAX → 300 s	Setting ___ s	Stage controller, Capacity Control: FsC CC maximum active time
	SC CC RECOVR MIN → 15 s	Setting ___ s	Stage controller, Capacity Control: FsC CC minimum recovery time
	SC FAST STOP DLY → 2 s	Setting ___ s	Stage controller: FsC OFF delay at fast stop
	SC FsD TOT OP RS → FALSE	Selection _____	Stage controller: FsC reset total operating times
	SC FsD NMB ST RS → FALSE	Selection _____	Stage controller: FsC reset total start count
	SC STAGE NMB MAX → 1	Setting _	Stage controller: FsC maximum number of stages
	SC LOGIC TYPE → 1	Setting _	Stage controller, FsC type of logic: 0: Normal; 1: Swop 1 (FsC); 2: Swop 2
	SC CODE TYPE → 0	Setting _	Stage controller, FsC type of code: 0: MBC; 1: GBC; 2: MGBC
	SC CODE OFFSET → 0	Setting _	Stage controller: FsC code offset:
	SC CC OUT → 0	Setting _	Stage controller: Internal Capacity Control output activated
	SC VsD CAPACITY → 100.00	**Setting** ___._	Stage controller: Set VsD capacity
	SC VsD CC CPCTY → 100.00 %	**Setting** ___._ **%**	**Stage controller: Set VsD capacity when capacity controlled**
	SC FsD FREQ → 50.00 Hz	Setting __.__ Hz	Stage controller: Set FsD frequency
	SC FsDO CAPACITY → 100.00	Setting	Not used
	SC FsDO CC CPCTY → 0.00 %	Setting	Not used
	SC FsD1 CAPACITY → 100.00	**Setting** ___._	**Stage controller: Set FsD1 capacity**
	SC FsD1 CC CPCTY → 100.00 %	**Setting** ___._ **%**	**Stage controller: Set FsD1 capacity when capacity controlled**
	SC FsD2 CAPACITY → 100.00	**Setting** ___._	**Stage controller: Set FsD2 capacity**
	SC FsD2 CC CPCTY → 100.00 %	**Setting** ___._ **%**	**Stage controller: Set FsD2 capacity when capacity controlled**
	SC FsD3 CAPACITY → 100.00	Setting	Not in use
	SC FsD3 CC CPCTY → 0.00 %	Setting	Not in use
	SC FsD4 CAPACITY → 100.00	Setting	Not in use
	SC FsD4 CC CPCTY → 0.00 %	Setting	Not in use
	SC CAPACITY TYPE → 1	Selection	Stage controller: Set capacity calculation type
	SC DIAGNOST SEL → 1	**Selection** _	**Stage controller: Diagnostic select**

AVAILABLE SOON

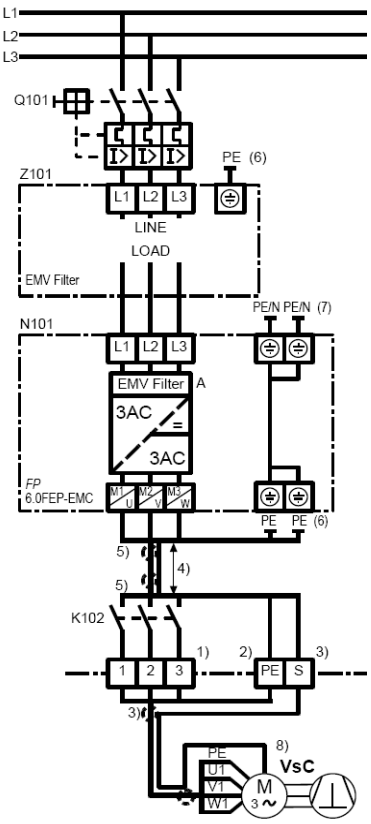
0: FsD with longest run time		**1: Longest run time**		Output value:
2: FsD with longest stop time		**3: Longest stop time**		
4: Run/Stop : times 10:	**11: Total : running 17: times**	**18: Total : number 24: of starts**	**FsD1: : FsD7:**	**DIAGNOSTICS SC DIAGNOSTIC**

POWER SECTION

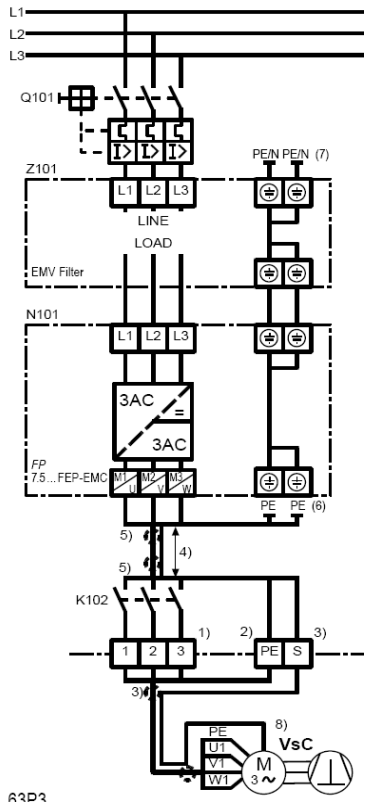
Power connections



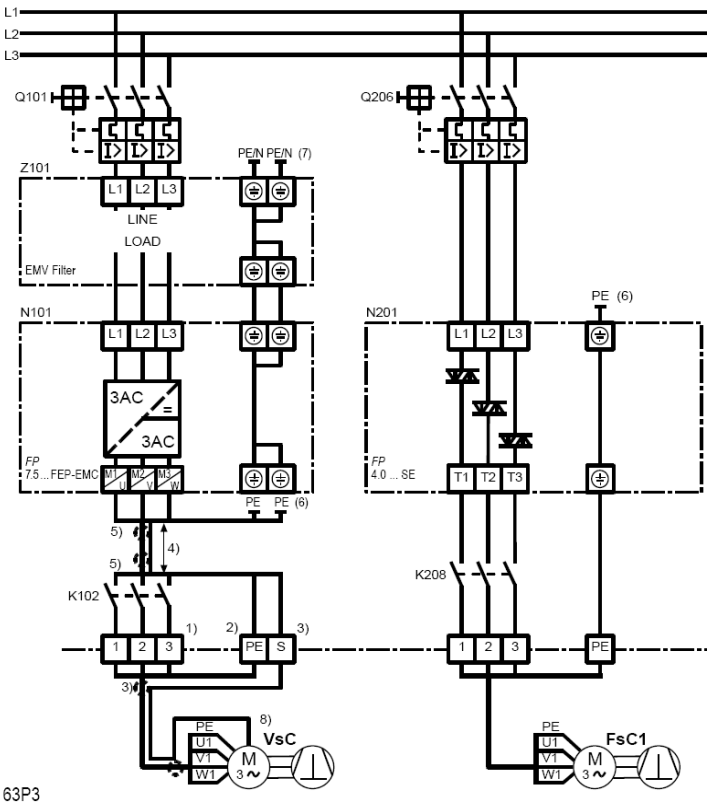
FP 4.0FEP / iS RCF9.5:
Power wiring



FP 6.0FEP / iS RCF14:
Power wiring



FP 7.5 ... 90FEP / iS RCF23 ... 205:
Power wiring



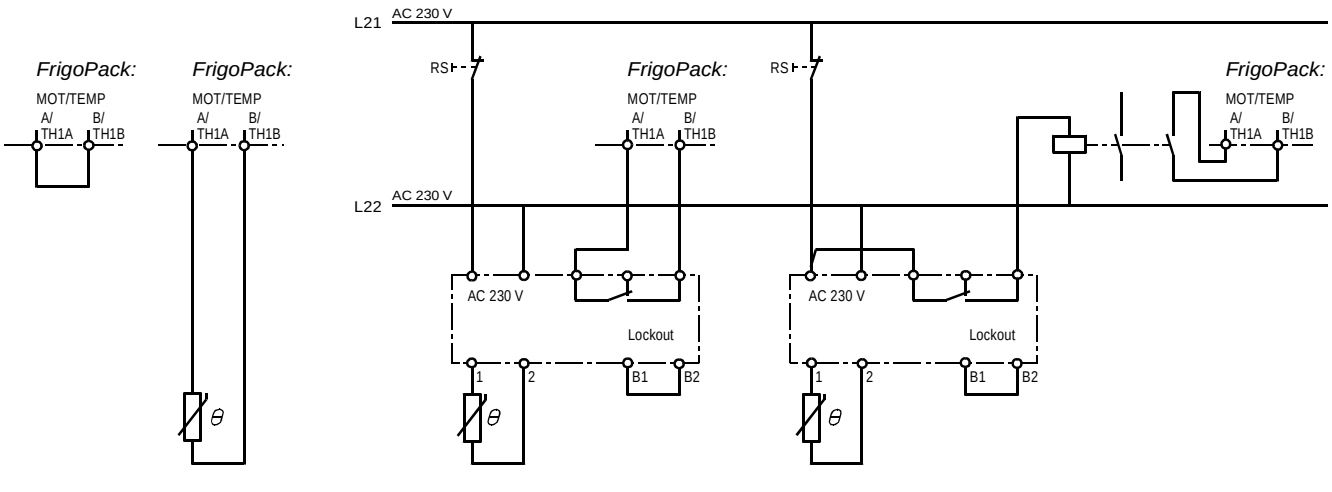
FP 7.5 ... 90FEP / iS RCF23 ... 205:
Power wiring with two compressors

Power terminals

Terminal / Designation	Signal / Function		Explanation	Further information
PE, PE	**FP ...30FEP-EMC / iS RCF23 ... 73: Protective earth connections (both to be earthed)**		- Observe all safety and EMC requirements	**7.7.1**
PE	**FP 37... FEP-EMC / iS RCF87...: Protective earth connection**			
L1	**Three phases of voltage supply**		- Ensure that supply voltage agrees with data on FrigoPack / iSpeed name plate	**7.7.1**
L2/N				
L3				
DC+			- Do not use otherwise risk of damage to FrigoPack / iSpeed	
(DBR)				
DC-				
M1/U	**Compressor motor**		- Variable-speed Compressor via safety contactor	**7.7.1/ 7.7.2**
M2/V				
M3/W				
PE	**Protective earth connection to compressor motor**			**7.7.2**
(DBR+)			- Do not use otherwise risk of damage to FrigoPack / iSpeed	
(DBR-)				
AUX1	**Only with: FP 55...FEP-EMC / iS**		- Supply externally	**6.7**
AUX2	**2AC 230 supply for equipment fan**			**6.8.4**

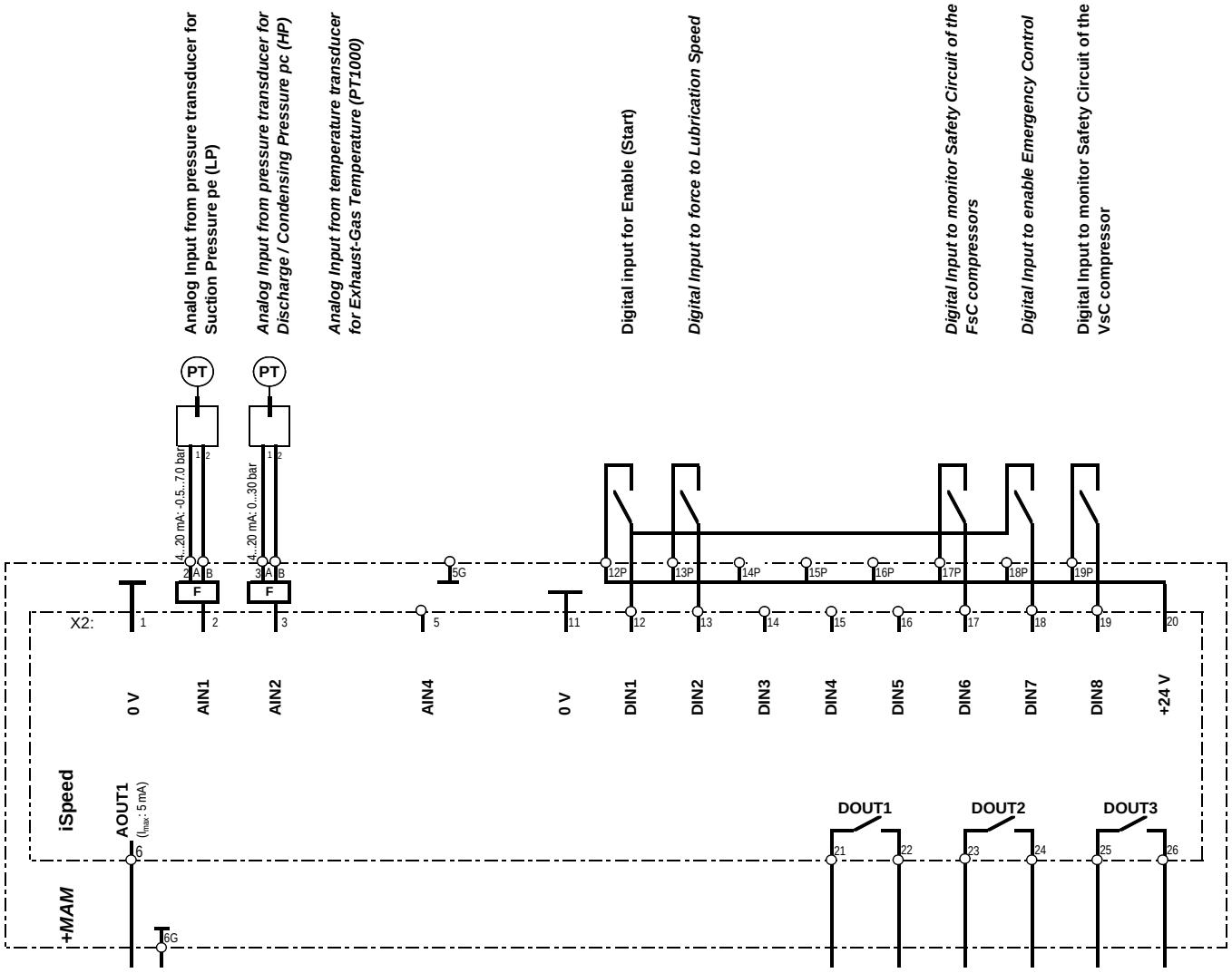
Terminals for motor protection

Terminal / Designation	Signal / Function		Explanation	Further information
X2:				
MOT/ TEMP	**Alternative a), Without processing:**		- Thermistor protection is processed in safety circuit, these two terminals must be linked	**6.2**
	Alternative b), Direct processing of motor thermistors:		- Connect motor thermistors between these two terminals	
	Alternative c), Processing an external thermistor relay:		- Connect the "normally open" contacts of external thermistor relay (e.g. KRIWAN) between these two terminals	
	Alternative d), Processing an external thermistor relay:		- Connect the "Normally open" contacts of an auxiliary relay wired to an external thermistor relay (e.g. KRIWAN) between these two terminals.	



CONTROL SECTION

Control connections



- **VsF Condenser fan: Actuating Value /**
- VsC: Measured speed /
- VsC: Control of hot gas bypass valve /
- pc limiting

Analog Output depending on setting:

A1:AOUT1 FUNCTN

- **Depending on setting:**
- **"VsC Ready for operation" /**

Relay depending on setting:

"VsC Operating" to control auxiliaries such as:
- **Crankcase heater, Condenser fan, Start unloader**

Relay:

A4:DOUT1 FUNCTN

- **FsC1: Activate /**
- FsC2: Activate /
- Capacity Control /
- No high-pressure limiting/
- Minimum capacity /
- Minimum capacity delayed /
- pe>=pemax/
- Compressor swop

Relay output depending on setting:

A5:DOUT3 FUNCTN

VsC: Variable-speed Compressor

FsC: Fixed-speed Compressor

FP(E) FEP-14 / iSE(P) RCF
FrigoSoft 1.6

Special settings

A1:AOUT1 FUNCTN

Setting		Function
-	**INPUT 0**	**VsF: Actuating Value**
-	INPUT 1	VsC: Measured speed (Frequency)
-	INPUT 2	Not used
-	INPUT 3	No high-pressure limiting

A4:DOUT1 FUNCTN

Setting		Function
-	INPUT 0	FsC1: Activate
-	INPUT 1	FsC2: Activate
-	**INPUT 2**	**Activate capacity control**
-	INPUT 3	No high-pressure limiting
-	INPUT 4	Minimum capacity
-	INPUT 5	Minimum capacity delayed
-	INPUT 6	pe >= pemax
-	INPUT 7	General purpose swop signal

A5:DOUT3 FUNCTN

Setting		Function
-	**INPUT 0**	**FsC1: Activate**
-	INPUT 1	FsC2: Activate
-	INPUT 2	Activate capacity control
-	INPUT 3	No high-pressure limiting
-	INPUT 4	Minimum capacity
-	INPUT 5	Minimum capacity delayed
-	INPUT 6	pe >= pemax
-	INPUT 7	General purpose swop signal

AVAILABLE SOON

Terminals for control functions

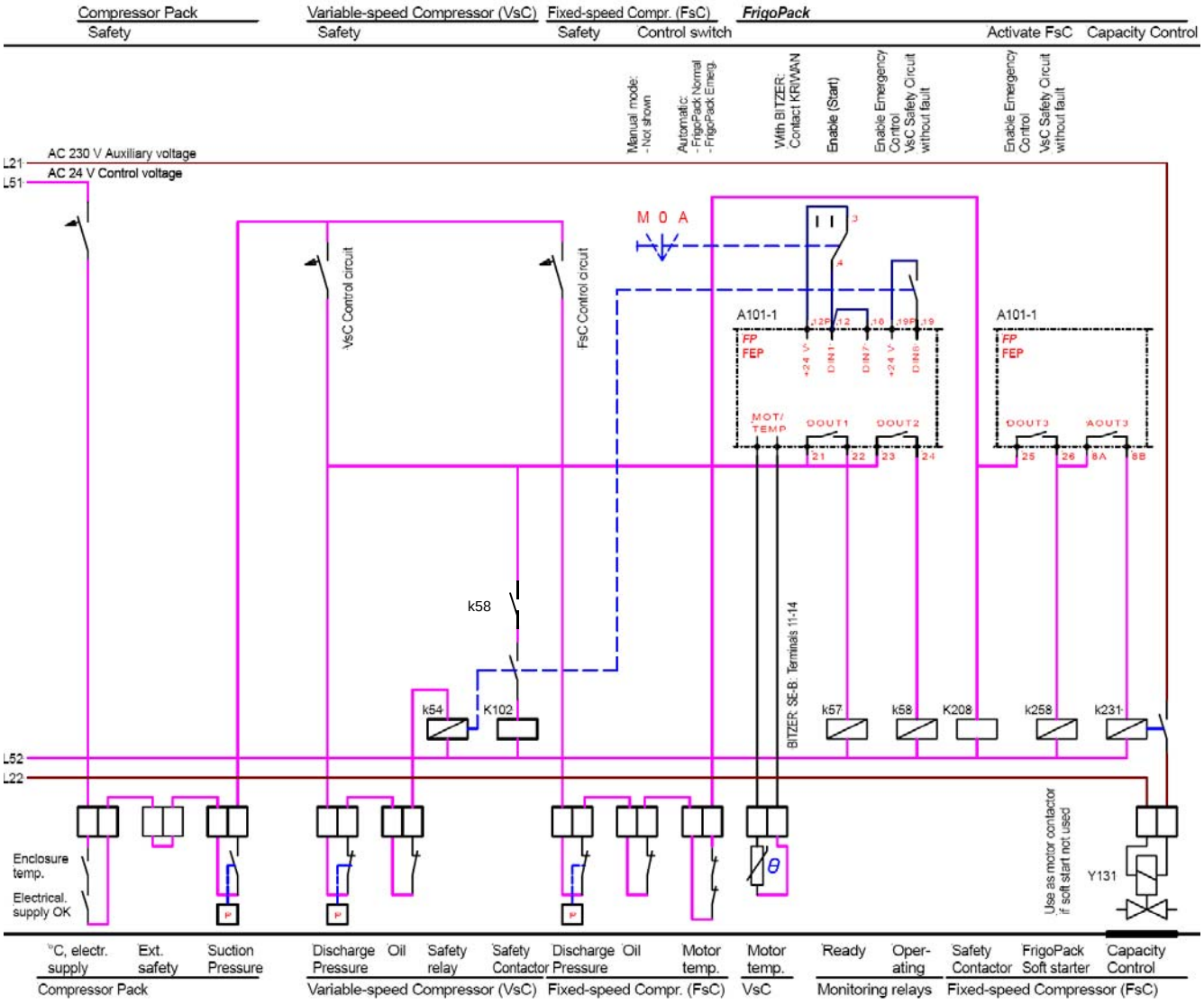
Terminal / Designation		Signal / Function	Explanation	Further information
2A - 2B	**AIN1**	**Analog Input from pressure transducer for Suction Pressure pe (LP):** **0 mA: Fault** **4 mA: -0.5 bar** **20 mA: +7.0 bar**	- Suction pressure pe (LP), must be used - Suitable pressure transducer: - A REF-P-TRANSD-LP7+PL - Connections: - 1 --> 2A; 2 --> 2B	**7.7.4**
3A - 3B	***AIN2***	***Analog Input from pressure transducer for Discharge / Condensing Pressure pc (HP):*** ***0 mA: Not used*** ***4 mA: 0.0 bar*** ***20 mA: +30.0 bar***	- *Discharge / condens. pressure Pc (HP), optional use* - *Suitable pressure transducer:* - *A REF-P-TRANSD-HP30+PL* - *Connections:* - *1 --> 3A; 2 --> 3B*	***7.7.4***
5 - 5G	AIN4	Not used		
6 - 6G	**AOUT1**	**Analog Output (5 mA max. load):** 0 V: **0.00 % Actuating value** +10 V: **100.00 % Actuating value**	- Depending on setting: **A1:AOUT1 FUNCTN** - 0: VsF Condenser fan: Actuating Value / - 1: VsC: Measured speed / - 2: Not used	**7.7.3**
		Digital Output with ext. special relay: Open: Not activated Closed: Activated	- 3: pc limiting - Only use special relay A RELAY-DC12V (available as accessory)	
7	AOUT2	Not used		
8	AOUT3	Not used		
12P - 12	**DIN1**	**Digital input for Enable (Start):** **0 V: Stop** **+24 V: Enable**	- Enable / Start	**5.2.1-4, 7.7.3**
13P - 13	***DIN2***	***Digital Input to force to Lubrication Speed:*** ***0 V: Normal*** ***+24 V: Lubrication speed***	- *Force Lubrication Speed* - *Optional use* - *Requires external timer*	***5.3, 7.7.3***
14	DIN3	Not used		
15	DIN4	Not used:		
16	DIN5	Not used:	- pc Setpoint selection - Optional use	
17P - 17	***DIN6***	***Digital Input to monitor Safety Circuit of the FsC compressors:*** ***0 V: >=1 FsCs not available or faulty*** ***+24 V: All FsCs available and fault free***	- *FsC Safety circuits without fault (Enables swop logic if all FsCs are available)* - *Alternative use: VSC continuous operation*	***5.3, 7.7.3***
18P - 18	***DIN7***	***Digital Input to enable Emergency Control:*** ***0 V: No Emergency Control*** ***+24 V: Activate Emergency Control***	- *Emergency operation (Operation with a defect inverter or compressor)* - *Optional use*	***5.3, 7.7.3***
19P - 19	**DIN8**	**Digital Input to monitor Safety Circuit of the VsC compressor:** **0 V: External fault** **+24 V: Normal (no fault)**	- VsC Safety circuit without fault - Must be used - Interrupt if there is a fault (Required to stop inverter operation)	***5.4, 7.7.3***
21 - 22	**DOUT1**	**Relay output "VsC Ready":** Open: **No supply, fault or alarm** Closed: **Ready (no fault)**	- Depending on setting: Relay: **A4:DOUT1 FUNCTN** - 0: FsC3: Activate / - 1: Capacity Control / - 2: No high-pressure limiting/ - 3: Minimum capacity / - 4: Minimum capacity delayed / - 5: pe>=pemax/ #NV #NV	**5.4, 7.7.3**
		Optional additional functions with multiplex: **Relay "Ready+Multiplex":** Open: **No supply, fault or alarm** Closed: **VsC Ready OR (VsC Operating AND Multiplexed Signal)** Enable multiplex: **DATA 1 LOGIC 3: FALSE**	- Max contact load: AC 230 V, 250 VA	
23 - 24	**DOUT2**	**Relay output "VsC operating":** Open: **VsC: Inhibited / Not operating** Closed: **VsC: Starting / Operating**	- "VsC Operating" to control auxiliaries such as: Crankcase heater, Condenser fan, Start unloader - Max contact load: AC 230 V, 250 VA	**5.4, 7.7.3**

VsC: **Variable-speed Compressor (Inverter operation)** VsF: **Variable-speed fan (condenser)**
FsC: **Fixed-speed Compressor**

Terminal / Designation		Signal / Function	Explanation	Further information
25 - 26	**DOUT3**	**Relay output to activate FsC1:** Open: **Not activated** Closed: **Activated**	- Depending on setting: **A5 : DOUT3 FUNCTN** - 0: FsC1: Activate / - 1: FsC2: Activate / - 2: Capacity Control / - 3: No high-pressure limiting/ - 4: Minimum capacity / - 5: Minimum capacity delayed / - 6: pe>=pemax/ - 7: Compressor swop - Max contact load: AC 230 V, 250 VA	**7.7.3**

VsC: Variable-speed Compressor (Inverter operation) VsF: **Variable-speed fan (condenser)**
FsC: Fixed-speed Compressor

Safety and control circuits



Important note:

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

It is recommended that the following additional functions are included in the control system:
- MANUAL mode of operation using a "Pump Down" circuit
- A security circuit to provide:
  - Automatic selection of MANUAL operation in an emergency
  - Means of stopping the evaporators if compressors are not available.

- Standard suggestions for the safety and control wiring with these features are available on request.
- KIMO RHVAC can assist with the planning of complex systems or systems with special requirements.

FIRST TIME POWER UP

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

Language selection:

- Power up holding key 'PROG' depressed
- Release key 'PROG' and press key 'M'
  - Arrow to left of second line should appear
- Select required language with the arrow keys 'UP' / 'DOWN'

- Press key 'E' 4x followed by key 'M' 2x
  - OPERATOR menu ist selected

Selection of this refrigeration application, Restoring factory settings:

- Power up while holding arrow keys 'UP' and 'DOWN' depressed.

  `RESTORE DEFAULTS | UP TO CONFIRM`

  should be shown
- Press arrow key 'UP'
  - A short moment later

    `APPLICATION | NONE`

    will be shown
- Press key 'M'
  - Arrow to left of second line should appear
- Select configuration: `FrigoSoft16.2_1x` with arrow keys 'UP'/'DOWN'
- Press key 'E', wait a short moment, press key 'E' 2x and verify if correct configuration has been
- Store loaded configuration as follows

Storing configurations and parameter changes:

- Press key 'PROG' 3s long

  `SAVE CONFIG | UP TO CONFIRM`

  should be shown
- Press arrow key 'UP' and wait until following message is shown in the second line:

  `SAVING -> COMPLETE`
- Press key 'E' 2x followed by key 'M' 2x
  - OPERATOR menu ist selected

Pressure transducers:

This refrigeration application is designed for use with the following pressure transducers:

- pe: -0.5 ... 7.0 bar	-7.25 ... 101.53 psi	Relative (gauge) pressure
- pc: 0 ... 30 bar	0.00 ... 435.11 psi	"

WARNING: Only use approved pressure transducers

TROUBLE SHOOTING LIST

PROBLEM	POSSIBLE CAUSE	Hints for fault finding	REMEDIES
*** TRIPPED *** T01:OVERVOLTAGE	* Voltage of supply too high	- Measure and document the voltage in all three input phases	- Rectify cause of any high voltage
	* Safety contactor not controlled correctly	- Check wiring of control circuit and compare function with KIMO RHVAC recommendations	- Modify wiring
	* Compressor motor defect	- Test if compressor motor will run with DOL supply	- Replace compressor motor
		- Measure resistance of motor winding and compare with manufacturer's data - Check insulation beween phases and to earth	
*** TRIPPED *** T02:UNDERVOLTAGE	* Voltage of supply too low	- Measure and document the voltage in all three input phases	- Rectify cause of any low voltage
*** TRIPPED *** T03:OVERCURRENT	* Phase of supply voltage missing		
*** TRIPPED *** T24:IGBT DESAT	* Safety contactor not controlled correctly	- Check wiring of control circuit and compare function with KIMO RHVAC recommendations	- Modify wiring
	* Compressor motor defect	- Test if compressor motor will run with DOL supply	- Replace compressor motor
		- Measure resistance of motor winding and compare with manufacturer's data - Check insulation beween phases and to earth	
	* Power section of FrigoPack / iSpeed faulty	- Remove motor cable connections to FrigoPack / iSpeed	- Replace FrigoPack / iSpeed
		- Check if operation of FrigoPack / iSpeed without a motor connected is possible (No trip message: Probably OK; Trip message: Probably defect) - Test for operation with a small test motor	
	* Incorrect motor connection	- Check wiring to motor terminals (choice of star/delta, part winding etc.)	- Modify wiring
*** TRIPPED *** T05:SAFETY CIRCT	* Safety contactor not controlled correctly	- Check wiring of control circuit and compare function with KIMO RHVAC recommendations	- Modify wiring
	* Safety device in safety circuit tripped	- Check safety circuits	- Reset if necessary
	* DC 24 V control voltage missing	- Check DC 24 V control voltage at FrigoPack / iSpeed	- Modify wiring
		- Short circuit with DC 24 V control voltage	
*** TRIPPED *** T06:AIN1 BREAK	* Suction-pressure transducer not connected or connections swapped	- Check if blue LED at the input of FrigoPack / iSpeed lights	- Verify correct connection to transducer for suction pressure. Exchange leads if necessary
	* Transducer for suction pressure faulty	- Measure current from transducer for suction pressure at input to FrigoPack / iSpeed (must be at least +4 mA)	- Replace transducer for suction pressure
*** TRIPPED *** T09:I*T LIMIT	* Compressor start aborted	- Liquid refrigerant in compressor?	- Contact KIMO RHVAC for advice
		- Defect compressor - Unsuitable FrigoPack / iSpeed settings	
*** TRIPPED *** T17:MOT OVERTEMP	* Link TH1A-TH1B or MOT/TEMP missing	- Check wiring of control circuit and compare function recommendations	- Modify wiring
	* No connection to motor protection PTC		
	* Faulty connection to external PTC relay		
	* Motor winding too hot	- Compressor overloaded	- Contact KIMO RHVAC for advice
*** TRIPPED *** T28:AIN1/2 ERROR	* Transducer for pressure faulty	- Measure current from transducer at input to FrigoPack / iSpeed (must be between 4 .. 20 mA)	- Replace pressure transducer
	* Non compatible type of pressure transducer	- Check if type of pressure transducer is compatible by referring to Section 3.3 or 7.7.4 of the Product Manual	- Replace pressure transducer by compatible type
*** TRIPPED *** ?ANYTHING ELSE?	* Anything else		- Contact KIMO RHVAC for advice

Important note: These messages are of common trips likely to occur during commissioning.
Other trip messages can occur in fault conditions.

When requesting advice from your supplier, always make an exact note of the following:
- Exact trip message in both lines of display
- Message displayed when key 'E' is pressed for at least 10 s.

CHECKLIST AND ADDITIONAL DATA FOR PROBLEM REPORT

KIMO Problem Code		Part of installation	Checklist of questions for PROBLEM REPORT	Explanation	Terminals	Answer/ Confirmation
ES		Electrical: - Supply	• Are there any known power supply interruptions ? • Do these power supply interruptions occur at the same time each day ? • By what amount does the supply voltage vary ?	- Indicate approx. times - Indicate min. and max. voltages		Yes ☐ No ☐ Yes ☐ No ☐ When: _____ Min.: _____ [V] Max.: _____ [V]
EI		- Installation	• Motor cable: Approx. Length ? • Motor cable: Type of screen ? • Motor cable: Screen connected to mounting plate? • Motor cable: Screen connected to metal motor housing ? • Is a galvanised mounting plate used in the electrical enclosure ? • Is a motor filter used between the FrigoPack / iSpeed and the compressor motor ?	- Copper braid ?, Steel braid ?, - Steel conduit ?, none ? - Recommendations: - Contact with large surface area - Make sure no "pig tails" - If yes, indicate KIMO product code		_____ Cu brd. ☐ Fe brd. ☐ Fe cond. ☐ None ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Pr. Cde: _____
MT		Compressor motor	• Have motor currents been entered into the PROBLEM REPORT ?	- Operating point - Start up		Yes ☐ No ☐ Yes ☐ No ☐
MM MM	 CI	*FrigoPack* / iSpeed: - Control and sensor inputs	• Protective Earth of FrigoPack / iSpeed connected to mounting plate (two separate short connections) ? • Is the DC P24 control voltage present ? • Connection of PTC motor protection ? • Safety circuit OK ? • Enable signal present ? • *External setpoint or actuating signal present ?* * • Signal from suction-pressure transducer present ? • *Signal from high-pressure transducer present ?* * • *Signal from exhaust temperature transducer present (link if not used) ?* * • * If used	- Terminal: - Terminal: - Without processing - Direct processing of motor thermistors - Processing an external thermistor relay - Terminal: - Terminals for measuring: - Terminals for measuring: - *Terminals for measuring:* - Terminals for measuring: - *Terminals for measuring:* - *Terminals for measuring:* - *Terminals for measuring:* - Terminal for measuring: - Measured against green terminal:	2x PE 15P - GN MOT/TEMP 19 - GN 12 - GN 5 - GN 2B - GN 3B - GN 4B - GN 4A - 4B	Yes ☐ No ☐ Yes ☐ No ☐ Linked ☐ Direkt ☐ Relay ☐ Yes ☐ No ☐ Yes ☐ No ☐ _____ [V] _____ [V] _____ [V] _____ [V] Yes ☐ No ☐
MM	PS	- Power section	• Reserved for future use			
MM	CA	- Control assembly	• Reserved for future use			
MM	CS	- Control settings, parameter	• Operating Mode LOCAL (Programming Pad: LEDs SEQ + REF light) ? • Refrigeration / cooling parameters set ?	- Not suitable for normal operation, only use for commissioning: - The following parameters must be set: **30: … 50:**		Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐
RI	 AP	Refrigeration: - Application	• Required Refrigeration Power entered into PROBLEM REPORT ? • Number of cooling outputs entered into the PROBLEM REPORT ? • Operating pressure and temperatures entered into PROBLEM REPORT ? • On/Off times of compressor pack entered into PROBLEM REPORT ?	- Operating point - At start up - Enter variable and fixed speed compressor times separately		Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐
RI	IN	- Installation	• Reserved for future use	- tbd		
RI	PS	- Pressure transducers	• Approx. cable length • Type of screen • Screen NOT connected at sensor end ? • Screen connected to mounting plate of electricial enclosure ? • Are measured pressures stable ?	- Copper braid ?, Steel braid ?, - Steel conduit ?, none ? - Large area contact, no pig tails - Indicate range of variation within 30 s		_____ [m] Cu brd. ☐ Fe brd. ☐ Fe cond. ☐ None ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ pe/LP ____ pc/HP ____ [bar]
RI	RC	- Refrigeration compressor	• Oil present ? • Basic data entered into PROBLEM REPORT ?			Yes ☐ No ☐ Yes ☐ No ☐

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FrigoSoft 1.6

REFR/COOL
FS 1.6.2-2x

SPORLAN

KIMO
Refrigeration HVAC

CONFIGURATION OVERVIEW / PROBLEM REPORT
(Put cross in box where appropriate)

Application	Refrigeration ☐	No. of cooling outlets ____	Air Conditioning ☐	Condenser ☐	Other ____					
Refrigerant	R404A..... ☐	R407C..... ☐	R134a..... ☐	Total refrig. Power ____ [kW]	Other ____					
	R507A..... ☐	R22..... ☐	R.....		____					
Compressor 1	Piston ☐	No. of cylinders ____	Scroll ☐	Screw ☐	Other ____					
	Start unloader ☐	Part Winding ☐	Variable speed ☐ **OR**	Fixed speed ☐	No. of compressors ____					
	Capacity control ____ [%]	____ [%]	____ [%]	____ [%]						
	Manufacturer ____		Model ____		Anything special ____					
Compressor 2	Piston ☐	No. of cylinders ____	Scroll ☐	Screw ☐	Other ____					
	Start unloader ☐	Part Winding ☐	Variable speed ☐ **OR**	Fixed speed ☐	No. of compressors ____					
	Capacity control ____ [%]	____ [%]	____ [%]	____ [%]						
	Manufacturer ____		Model ____		Anything special ____					
Operating point	Suction pressure ____	High (discharge) pressure ____	Pascal/ ☐	Suction gas temperature ____ [°C]	Discharge gas temperature ____ [°C]	Motor current ____ [A]				
			bar/ ☐							
			lb/in² gauge/ ☐							
Start up	Suction pressure ____	High (discharge) pressure ____	absolute ☐	Anything special ____		Motor current ____ [A]				

Speed variator	**FrigoPack/iSpeed/**MotorMaster Type FP/MM Serial number ____	**Pressure sensors** Suction pressure ____ Discharge pressure ____	**FrigoSoft refrigeration/ A/C software** FS 1.6.2-2x Version ____ Mode ____
Soft Starter	**FrigoPack/iSpeed/**SoftCompact, LEKTROMIK Type FP/SC/LEK Serial number ____	**Switching times of compressor pack** Variable-speed compressor (VsC) t_{ON} ____ [s] t_{PERIOD} ____ [s] Fixed speed compressor(s) (FsCs) t_{ON} ____ [s] t_{PERIOD} ____ [s]	

Report

List of adjustable parameters in OPERATOR menu ____

30:pe MINIMUM	2.5 bar	[bar]
33:pe SETPOINT	3.3 bar	[bar]
39:pe MAXIMUM	6.0 bar	[bar]
43:pc SETPOINT	17.3 bar	[bar]
49:pc MAXIMUM	23.0 bar	[bar]
61:VsC CURR MAX	FFF.FF A	[Hz]
62:VsC FREQ MAX	60.0 Hz	[Hz]
65:VsC FREQ MIN	25.0 Hz	[Hz]
66:VsC SKIP FREQ	0.0 Hz	[%]
67:VsC SKIP BAND	0.0 Hz	[Hz]
70:VsC tinh TIME	FFF.F s	[s]
71:VsC thld TIME	10.0 s	[s]
74:VsC tmon fmin	30.0 s	[s]
76:VsC toil STRT	4.0 s	[s]
81:FsC ton DLY	FFF s	[s]
82:FsC toff DLY	FF s	[s]
83:FsC NUMBER	1	
91:pe CNTRL P-GN	F.00	
92:pc CNTRL P-GN	10.00	
93:VsF CD MIN SD	15.00	
A1:AOUT1 FUNCTN	INPUT O	
A4:DOUT1 FUNCTN	INPUT O	
A5:DOUT3 FUNCTN	INPUT O	
A9:LANGUAGE	ENGLISH	

TRIP HISTORY

TRIP 1	2	3	4	5	
TRIP TIME	(NEWEST)				(OLDEST)
TRIP 6	7	8	9	10	
TRIP TIME					

TIME IN SERVICE : ____ [s]

Manufacturer	Agent / Partner	Customer	Installation
KIMO Refrigeration HVAC Ltd EUR: Tel.: +49 911-8018778 Fax: +49 911-9976118 applications@frigokimo.com www.frigokimo.com **Parker Hannifin Corporation** **Parker Hannifin Ltd:** Tel.: +44 1226-273400 Fax: +44 1226-273401 eurocold@parker.com www.sporlan.com Sporlan Division: Tel.: +1 636-239-1111 Fax: +1 636-239-0414 svd_techsupport@parker.com www.sporlan.com			Name: Date:

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