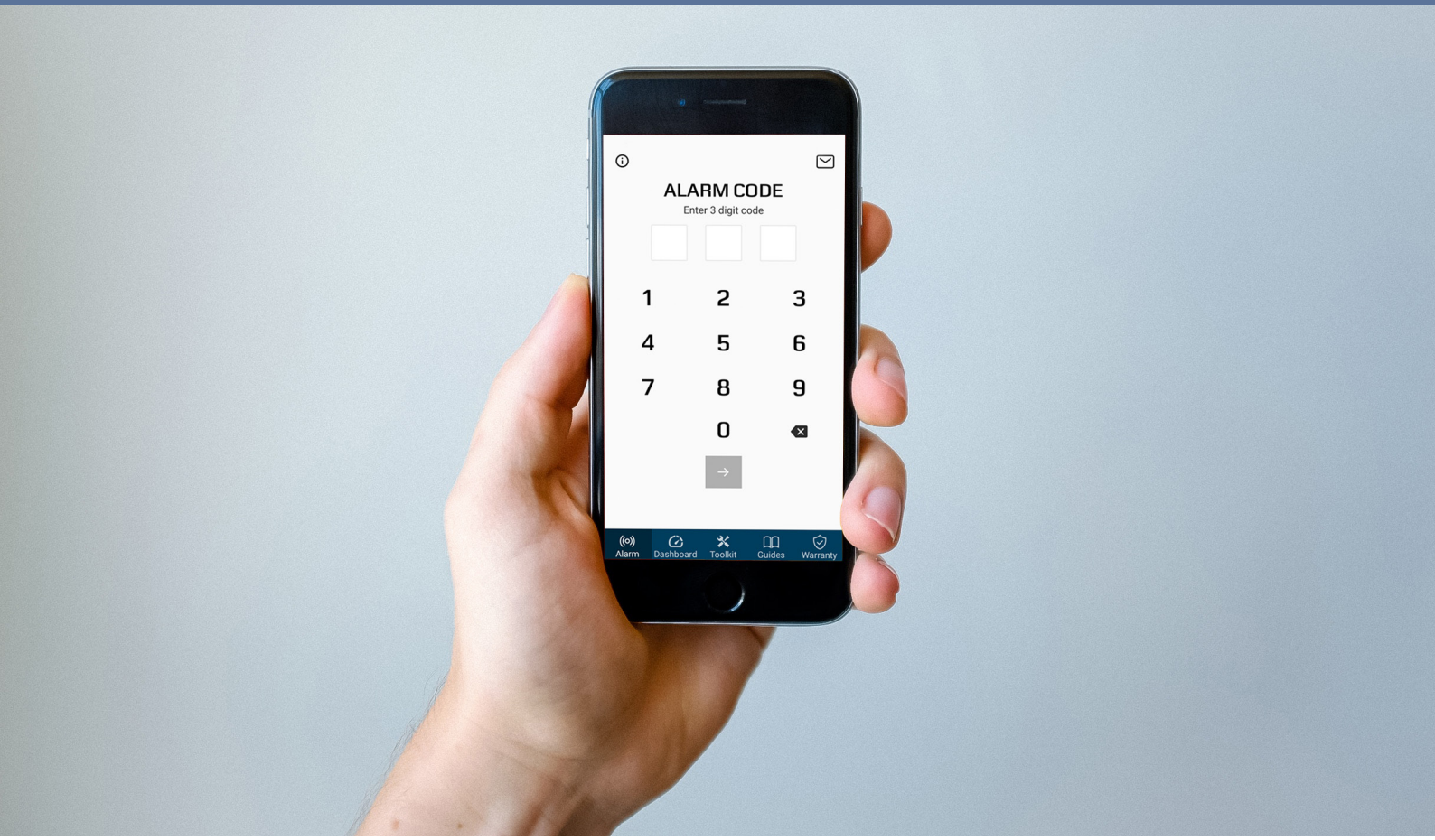
Alarm Descriptions
Star Cool Refrigeration Unit



Model SCI-20/40/CA and SCU-20/40

Version 810900E March 2021

STAR COOL

MAERSK CONTAINER INDUSTRY

1. Preface

This version of the manual is dated March 2021, edited by Maersk Container Industry AS.

This user's manual is valid for software version 0357 or newer versions.
The information herein is subject to change without notice and does not represent a commitment on any part of Maersk Container Industry AS. While the information herein is assumed to be accurate, Maersk Container Industry AS assumes no responsibility for any errors or omissions that may appear in this documentation.

This manual is valid for:

Model	SCI - 20/40/CA and SCU - 20/40
Software version	0357

2. Warnings

Do not operate or maintain this refrigeration unit until you have familiarized yourself completely with the equipment and operation of this unit by reading the instructions in this manual.

Do not perform any welding on the unit before disconnecting the power plug. Furthermore, disconnect the power measurement module and main controller (and modem if present).

Disconnect the main power supply to the unit before inspecting the interior of the controller box.

The unit is charged with R134a or R513A and ester oil BSE 55. Do not use any other refrigerant or oil. Do not use contaminated refrigerant or oil. Never release any refrigerant into the atmosphere. Use recovery equipment according to present legislation.

During maintenance, please observe that refrigerants operate with high and low temperatures in combination with high pressures, which may cause personal injuries if not handled properly.

During recovery and maintenance of the refrigerant, personal protection equipment must be worn.

Do not trap any liquid refrigerant inside pipes during soldering work. This may lead to an explosion of the pipes.

Please note that some unit models do not have Schräder valves installed for Psuc and Pdis transmitters.

We do not recommend cleaning the inside of a reefer container with soap/chemicals with a PH value below 7. However, if this occurs, clean the evaporator coil through the inspection hatches with a soap that has a PH value between 7 and 9. This cleaning is vital to reduce the risk of copper damage in the evaporator coil.

Do not enter the container, including opening the service hatches, when the oxygen level is below 20.9%. Ventilation is necessary before entering, either for repairing the unit or unloading. Stay away from doors while venting.

Human response to low oxygen atmosphere:

Oxygen content of air	Symptoms of a person exposed
20.9%	Level in ambient air - no effect.
15% - 19%	May impair coordination and induce early symptoms in persons who have coronary, pulmonary, or circulatory problems.
12% - 15%	Respiration and pulse increase, impaired coordination, poor perception and judgement.
10% - 12%	Respiration increases further in rate and depth, poor judgement, and bluish lips.
8% - 10%	Mental failure, fainting, unconsciousness, an ash-coloured face, blue lips, nausea, and vomiting.
6% - 8%	8 minutes - 100% fatal, 4-5 minutes - recovery with treatment.
4% - 6%	Coma within 40 seconds, convulsions, respiration ceases, death.

3. Contents

4. Legend

Short name	Name
AAS	Alarm Action System
Act	Actual
ACT	Automatic Cold Treatment
AirEx	Air exchange
AKS	Danfoss pressure transmitter
AL	Alarm
Atm	Atmosphere
AV	Automatic Ventilation
CA	Controlled Atmosphere
CalUs1	Calibration USDA sensor 1
CalUs2	Calibration USDA sensor 2
CalUs3	Calibration USDA sensor 3
CapReq	Requested capacity
Com	Communication
Cond	Condenser
Cpr	Compressor
CT	Cold treatment
Cur	Current
Err	Error
Evap	Evaporator
F	Frequency
Fact	Compressor actual frequency
FC	Frequency converter
Fcpr	Compressor frequency
FcprAct	Compressor frequency actual
FcprReq	Compressor frequency requested
Fpower	Power supply frequency converter
FT	Function test
FW	Firmware
H	Heater
Hevap	Evaporator heater
HP	High pressure
HPS	High pressure switch
Hpump	Vacuum pump motor heating element
I	Current
I1	Current phase 1
I2	Current phase 2
I3	Current phase 3
Ifc	Current in AC compressor motor
Init	Initialization
ITI	Intelligent Trip Inspection
LED	Light emitting diode
LP	Low pressure
M	Motor
Mcond	Condenser motor
Mcpr	Compressor motor

Short name	Name
Mevap	Evaporator motor
Mevap1	Evaporator motor 1
Mevap2	Evaporator motor 2
MOP	Maximum operating pressure
Mpump	Vacuum pump motor
MTS	Multi Temperature Setpoints program
NSK/DST	Saigonomya/DST P100 pressure transmitter
OH	Overheat
P	Pressure
PCB	Printed circuit board
Pdis	Discharge pressure
Pmem	Pressure membrane
Psuc	Suction pressure
PTI	Pre Trip Inspection
PTI Short	Pre Trip Inspection Short
Ptot	Power total
PWM	Pulse Width Modulation
Pwr	Power
Req	Requested
RH	Relative humidity
RHset	Relative humidity setpoint
RMM	Remote Monitoring Modem
S	Switch contact key
SC	Star Cool
Set	Setpoint
SH	Superheat
Shp	High pressure switch
Sup	Supply
T	Temperature
Tact	Actual temperature
Tamb	Ambient temperature
TC	Calculated condenser temperature
Tcargo	Cargo temperature
TCmin	Temperature condensor minimum
Tevap	Evaporator temperature
Tfc	Frequency converter temperature
Tint	Tinternal (controller board)
T0	Calculated suction temperature
Tret	Return air temperature
Tset	Temperature setpoint
Tsuc	Suction temperature
Tsup	Supply air temperature average
Tsup1	Supply air temperature 1
Tsup2	Supply air temperature 2
Tusda1	USDA 1 temperature

Short name	Name
Tusda2	USDA 2 temperature
Tusda3	USDA 3 temperature
Ubat	Battery voltage
Udc	DC voltage in frequency converter
U/f	Voltage/frequency ratio
V	Valve
Veco	Economizer valve
Vexp	Expansion valve
Vhg	Hot gas valve

5. Alarms

The alarm list holds all active and inactive alarms. By pressing (( )) all active alarms are shown. The full list of active/inactive alarms, fatal alarms, and warnings can be accessed by pressing (PTI) and viewing line T00. If any alarms are in the list, the icon (( )) is displayed in upper left corner of the main display.

Alarm handling is to protect the unit and the cargo, and to inform the user in case of error conditions.

Alarm handling is split into 2 parts:

1. Detect an abnormal situation and report it as an alarm.
2. React on the alarms and compensate for them (AAS - Alarm Action System).

An alarm can have 4 different levels:

- Log: Information for service. Only in the datalog, not on the display.
  No risk to cargo.
- Warning: Warning of an abnormal situation, but the unit continues to operate with unchanged or little change in functionality in the actual running mode.
  No risk to cargo.
- Alarm: The unit operates with reduced or changed functionality.
  Risk to cargo.
- Fatal Alarm: The unit potentially stops working and needs servicing immediately.
  Serious risk to cargo!

All alarms in the 4 levels can have two states:

- Active: The alarm is active.
- Inactive: The alarm is no longer active. The alarm can be acknowledged from the alarm list.

The 4 alarm levels will be treated by the controller in the following way:

Alarm type	Datalog	Alarm list	Red LED	Cargo risk
Log	Yes	No	OFF	No risk to cargo
Warning	Yes	Yes	OFF	No risk to cargo
Alarm	Yes	Yes	SLOW FLASH 2% ON, 98% OFF Duty time of 3 sec	Risk to cargo
Fatal Alarm	Yes	Yes	QUICK FLASH 80% ON, 20% OFF Duty time of 1 sec	Serious risk to cargo

Alarm handling is made to detect abnormal situations, possibly solve issues, and report the problems. The alarm types indicate for the operator, how severe the problem is for the safety of the cargo. Some problems are fluctuant where the problem may be fixed if the unit restarts. Some of the alarms are only warnings but will restart the unit to try to solve the problem. There is an individual time-out period for the alarms. A Warning will not stop the unit permanently. If a problem with Warning type continues to be active over a period, the problem seems to be of a more stable and therefore more severe character and another alarm is triggered with alarm type Alarm.

The AAS (Alarm Action System) will substitute a missing or malfunctioning sensor with one of the other sensors and thereby try to keep the cargo safe for as long as absolutely possible. The substitution may lead to a deteriorated control precision, especially in Freeze mode, but the unit is not fully stopped until there are no further sensors to substitute with. The unit may try to restart to see if the malfunctioning is fluctuant. For example, if there is no substitution for a sensor or the substitute sensor is also faulty, alarm 611 “Too many sensor err” is raised and the specific sensor(s) are listed separately in the alarm list.

The alarm list can include a maximum of 16 active/inactive alarms. In case of an empty alarm list, ☑ and “No alarms” is shown.

An active alarm is shown as Acc AAnnn, where cc is the list number from 01 to 16, and nnn is the actual alarm number. An inactive alarm is shown as Acc IAnnn, where cc is the list number from 01 to 16, and nnn is the actual alarm number.

An active alarm is not deletable from the list, but may change to the inactive state when the cause of the alarm is eliminated.

An inactive alarm is deletable from the list by pressing ↵ when displaying the alarm.

5.1 Detailed alarm description

In the following, all alarms are listed with a description, possible causes, and trouble shooting instructions.

- Alarm text is the text shown in the controller display.
- If Log is marked with a cross, then the alarm is logged in the data log.
- If Alarm is marked with a cross, then an error is shown in the controller alarm list.
- The following alarm light texts can be shown:

- Off: Indicates that the alarm diodes are de-energized and there are no active alarms.
- Slow flash: Indicates that the diodes are turned on shortly every 3 sec. and that there are active alarm(s).
- Quick flash: Indicates that the diodes are turned on for 0.8 sec. every 1 sec. and that there are active fatal alarm(s).

When troubleshooting several alarms, it is generally advisable to start with the active alarm that has the lowest number and then move up to the active alarms with higher numbers. Remember that some alarms have a time-out of 30 sec. or more.

5.2 Alarm list

The following list includes a view of all alarms as listed on the display with a description text. This list is continuously updated. Be sure to visit **alarm.starcool.com** for the latest version.

Id	Display text	Description	Alarm type
1. Temperature sensor alarms			
102	Tret invalid	Return air temperature sensor invalid	Alarm
105	Tsup 1 invalid	Supply air temperature sensor 1 invalid	Alarm
108	Tsup 2 invalid	Supply air temperature sensor 2 invalid	Alarm
111	Tusda 1 out of range	USDA 1 temperature sensor invalid	Log
114	Tusda 2 out of range	USDA 2 temperature sensor invalid	Log
117	Tusda 3 out of range	USDA 3 temperature sensor invalid	Log
120	Tcargo out of range	Cargo temperature sensor invalid	Log
123	Tevap invalid	Evaporator temperature sensor invalid	Warning
126	Tsuc invalid	Suction temperature sensor invalid	Alarm
129	Tamb invalid	Ambient temperature sensor invalid	Alarm
132	Tpump invalid	Vacuum pump temperature sensor invalid	Alarm
148	Tsup error	Supply air temperature error	Alarm
2. Pressure transmitter alarms			
202	Pdis unrealistic	Tc value is above the limit that is realistic for the system	Alarm
203	Pdis invalid	Compressor discharge pressure transmitter invalid	Alarm
206	Psuc unrealistic	T0 value is below the limit that is realistic for the system	Alarm
207	Psuc invalid	Compressor suction pressure transmitter invalid	Alarm
214	Pmem invalid	Vacuum pump pressure transmitter invalid	Alarm
3. Other sensors			
302	RH invalid	Relative humidity sensor invalid	Alarm
303	AirEx invalid	Air exchange sensor short circuit	Alarm
306	HPS switch - K1	High pressure switch is active	Fatal alarm
310	CO_2 sensor invalid	CO_2 sensor communication missing	Alarm
313	O_2 sensor invalid	O_2 sensor communication missing	Alarm
314	Replace CO_2 sensor	Replace CO_2 sensor	Warning
315	Replace O_2 sensor	Replace O_2 sensor	Warning

4. Power alarms			
400	Mevap 1 over heat	Evaporator motor 1 overheat	Fatal alarm
401	Mevap 2 over heat	Evaporator motor 2 overheat	Fatal alarm
402	Mcond over heat	Condenser motor overheat	Fatal alarm
403	Mpump over heat	Vacuum pump motor overheat	Alarm
415	Invalid power sup	U1-2 and U1-3 and U2-3 overvoltage	Fatal alarm
418	Invalid power sup	U1-2 and U1-3 and U2-3 undervoltage	Fatal alarm
421	Over current	I1-2 and I1-3 and I2-3 overcurrent	Fatal alarm
423	No phase direction	Phase direction not detectable	Fatal alarm
424	Power frequency	Phase frequency error	Log
425	Frequency too high	Power frequency too high	Fatal alarm
430	Cpr connection	Power cable from FC to compressor faulty	Alarm
5. FC alarms			
501	FC local control	FC setting in Local mode	Alarm
508	Compr connection	FC short circuit	Alarm
509	FC 24 V fault	FC internal 24 V supply fault	Alarm
510	Compr connection	FC earth fault	Alarm
511	Compr over current	Compressor over current	Alarm
513	Compr overload	Compressor overload	Alarm
514	Invalid power sup	FC undervoltage fault	Alarm
515	Invalid power sup	FC overvoltage fault	Alarm
516	FC supply error	Power supply error indication	Alarm
517	FC over temp	FC over temperature fault	Alarm
518	FC inrush	FC inrush fault	Alarm
519	FC internal error	Frequency converter high voltage fault warning	Alarm
523	FC phase loss	Power supply error indication	Log
530	FC alarm undefined	Unclear error in FC	Alarm
531	PCB temperature	FC critical temperature	Alarm
532	Blocked rotor	Compressor restart fail	Alarm
533	FC comm timeout	The FC has tripped and stopped	Alarm
6. Operation alarms			
600	No control sensors	Supply air sensor 1, supply air sensor 2, return air sensor all malfunctioning	Fatal alarm
601	No watercooling	Water-cooling fault	Alarm
603	In range fault	In-range fault	Fatal alarm
607	AirEx open	Air exchange valve open in conflict with settings	Alarm
608	Config AirEx Type	Air exchange type missing	Alarm
610	Defrost time exceed	Max. defrost time exceeded	Log
611	Too many sensor err	Too many (controlling) sensors have errors	Log
623	Loss of cooling	Attempts to cool down but Tsup is above Tret	Fatal alarm
624	Config valve type	System identifies controller was changed	Alarm
630	Manual phase dir	Manually selected phase direction	Warning
650	O_2 low	The O_2 sensor measures low O_2 levels in container	Alarm
651	CO_2 high	The CO_2 sensor measures high CO_2 levels in container	Fatal alarm
652	Vacuum fault	Vacuum pump unable to reach the required pressure	Alarm
653	Mpump heat element	Vacuum pump operating temperature is low	Alarm
654	Mpump temp high	Motor for vacuum pump is overheated	Alarm
656	Mpump service	Vacuum pump needs an oil and filter change	Warning
657	Mpump start failure	Vacuum pump operating in wrong direction	Fatal alarm
658	Mpump start failure	Vacuum pump cannot start due to bad U/f ratio	Alarm
660	Check coil	Coil(s) acting suspicious	Warning
661	Check contactor	Contactor(s) acting suspicious	Warning
662	Mevap lo contactor	Mevap low contactor detected to be faulty (only in heating)	Alarm
663	Mevap hi contactor	Mevap high contactor detected to be faulty (only in heating)	Alarm

664	Mevap contactors (both)	Both Mevap contactors detected to be faulty (only in heating)	Alarm
665	Hevap contactor	Hevap contactors detected to be faulty (only in heating)	Alarm
666	Reduced refr. flow	The flow of refrigerant in the system is reduced	Alarm
670	CA memb/hose leak	Vacuum pump has stopped due to leak	Alarm
671	Mpump vacuum loss	Vacuum pump has stopped due to loss of vacuum in the system	Alarm
672	Mpump oil low	Vacuum pump oil level is detected as being low	Alarm
7. Communication alarms			
700	No FC/Contr com	FC missing	Fatal alarm
710	No userpanel com	(Can only be seen in StarView)	Log
720	No SPM com	Communication to power module is missing	Alarm
730	No RH sens com	RH sensor is missing	Log
740	No CO_2 sens com	CO_2 sensor is missing or communication lost	Log
750	No SSC com	CA module is missing or communication is lost	Log
760	No O_2 sens com	O_2 sensor is missing or communication lost	Log
780	Modem	Sekstant gateway modem	Log
8. Test alarms			
800	Func test failed	Function test fault	Warning
801	Controller	Controller internal voltage reference fault	Warning
802	Air Ex Open	Manual airex is opened preventing other function tests to succeed	Warning
803	Reduced refr. flow	The flow of refrigerant in the system is reduced	Warning
805	Idle current	Unit idle overcurrent fault	Warning
810	Mevap cur LO speed	Evaporator motor low speed current fault	Warning
811	Mevap cur HI speed	Evaporator motor high speed current fault	Warning
812	Mevap current OFF	Evaporator motor off current fault	Warning
815	Mcond cur LO speed	Condenser motor low speed current fault	Warning
816	Mcond cur HI speed	Condenser motor high speed current fault	Warning
817	Mcond current OFF	Condenser motor off current fault	Warning
819	Contactor error	Contactor(s) acting suspicious	Warning
820	Hevap current ON	Evaporator heater on current fault	Warning
821	Hevap current OFF	Evaporator heater off current fault	Warning
822	Hevap current error	Hevap current failure	Warning
826	Hpump current ON	Heat vacuum pump too high or too low	Warning
827	Hpump current OFF	Measured current is too high when heater is turned off	Warning
828	Mpump oil level	Low oil in the vacuum pump	Warning
830	Mpump current error	Mpump current failure	Warning
831	Pmem sensor	Pmem above or below 1000 mBar (±60 mBar) after Mpump off for 300 sec.	Warning
832	CO_2 sensor	No reading or value above 1%	Warning
833	O_2 sensor	No reading or value out of range	Warning
836	Pmem vacuum	Unable to create vacuum	Warning
837	Pmem ambient	Not measuring Pmem pressure 1000 mBar (±60 mBar)	Warning
838	Mpump ON current	Current failure	Warning
839	Mpump OFF current	Current in off position is too high	Warning
840	Valve leaks	Valve leak fault	Warning
841	K1 contactor welded	Contactor damaged (always drawn) making FC always powered	Warning
842	Expansion valve	Expansion valve fault	Warning
844	Hot gas valve	Hot gas valve fault	Warning
846	FC check	FC internal fault	Warning
847	High press switch	High pressure switch fault	Warning
848	Temp press invalid	Temperature and pressure sensor malfunctioning	Warning
849	Valve error	Check that compressor can operate valves failed	Warning
850	PTI test failed	PTI test fault	Warning
851	Alarm is active	Active alarms turning ITI checkmark off	Warning
852	FC self test	FC self test not passed	Warning

855	PTI Tset 5	PTI 5°C set fault	Warning
860	PTI Tset 0	PTI 0°C set fault	Warning
861	Broken valve plates	Compressor mass flow indicates valve plate has become defect	Warning
862	LowRefrig/ExvBlock	Compressor mass flow too low	Warning
863	Expansion valve leak	Valve leaks fault	Warning
870	PTI defrost	PTI defrost fault	Warning
880	PTI Tset -18	PTI –18°C set fault	Warning
884	Psuc invalid	Compressor suction pressure transmitter invalid	Warning
885	Tsup1 invalid	Supply air temperature sensor 1 invalid	Warning
886	Tsup2 invalid	Supply air temperature sensor 2 invalid	Warning
887	Tevap invalid	Evaporator temperature sensor invalid	Warning
888	Tsuc invalid	Suction temperature sensor invalid	Warning
889	Tret invalid	Return air temperature sensor invalid	Warning
890	PTI Tset 13	PTI test fault	Warning
894	RH sensor	RH sensor communication missing	Warning
895	CO_2 sensor	The CO_2 sensor communication and CO_2 level are tested	Warning
896	O_2 sensor	The O_2 sensor communication and O_2 level are tested	Warning
897	Hpump broken	Vacuum pump could not be heated	Warning
899	ITI failed	ITI test fault	Log
9. Controller alarms			
902	Battery malfunction	Battery malfunctioning	Alarm
904	Datalog error	SCCU6 data log fault	Alarm
905	Database corrupt	SCCU6 database fault	Log
907	Realtime error	Real-time clock needs checking	Alarm
953	Temp ref 1 LO	Controller internal voltage reference fault	Warning
954	Temp ref 1 HI	Controller internal voltage reference fault	Warning
955	Temp ref 2 LO	Controller internal voltage reference fault	Warning
956	Temp ref 2 HI	Controller internal voltage reference fault	Warning
961	Pdis sens sup LO	Controller internal voltage reference fault	Log
962	Pdis sens sup HI	Controller internal voltage reference fault	Log
963	Psuc sens sup LO	Controller internal voltage reference fault	Log
964	Psuc sens sup HI	Controller internal voltage reference fault	Log
965	Controller sup LO	Controller internal voltage reference fault	Log
966	Controller sup HI	Controller internal voltage reference fault	Log
967	AirExMot sup LO	Controller internal voltage reference fault	Log
968	AirExMot sup HI	Controller internal voltage reference fault	Log
969	AirEx sens sup LO	Controller internal voltage reference fault	Log
970	AirEx sens sup HI	Controller internal voltage reference fault	Log
971	Sensor bus sup LO	Controller internal voltage reference fault	Log
972	Sensor bus sup HI	Controller internal voltage reference fault	Log
973	SUP6 SPM6 sup LO	Supply voltage SUP6 SPM6 low	Log
974	SUP6 SPM6 sup HI	Supply voltage SUP6 SPM6 high	Log
975	Internal sup LO	12 V supply voltage low on SMC6	Log
976	Internal sup HI	12 V supply voltage high on SMC6	Log
977	Pmem sens sup LOW	Controller internal voltage reference fault	Log
978	Pmem sens sup HIGH	Controller internal voltage reference fault	Log
990	Firmware update fail	Failed to activate firmware	Alarm
991	Config model mode	Model code missing	Alarm
994	Req min SW352-11	The software which has been uploaded to the controller is not compatible with the current hardware version, please use software 0352 rev. 11 or newer	Alarm
995	Contr internal error	Controller module must be replaced	Alarm
998	Could not detect CA	Unable to detect CA	Alarm
999	Keyboard failure	Indication of defective keyboard or connection	Warning

5.3 Temperature sensor alarms (AL 1XX)

102	Tret invalid					Alarm
Description	Return air temperature sensor invalid.					
Cause	• Unexpected behaviour in old software version. • Cable has been improperly spliced. • Indication of defective return air temperature sensor or its measuring circuitry. • Active alarms AL 100 or AL 101 (if CIM 5 software). • Temperature sensor reading is out of valid range: -50°C (-58°F) or above +100°C (+212°F).					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly. 3. If alarms AL 100 or AL 101 are active, check their trouble shooting first. 4. Disconnect the sensor cable for sensor Tret from the connector on the main controller, according to the wiring schematics inside in the control cabinet. 5. Measure the resistance between the two wires. If the resistance is out of range, see "Temperature sensor - resistance table", the temperature sensor and cable are defective and should be replaced.					
Criteria	Sensor is defective and the missing sensor reading has been substituted by a value from AAS system. See "Alarm Action System (AAS)".					
Controller action	Replaced by new value from AAS system.					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Deteriorated control precision in Freeze mode.					
Elimination	When sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Detection/error 1 = Max limit 2 = Min limit 5 = Relations 6 = Connection 7 = Derivatives 8 = Ventilation mode	Low limit	High limit	Actual value		

105	Tsup 1 invalid					Alarm
Description	Supply air temperature sensor 1 invalid.					
Cause	• Unexpected behaviour in old software version. • Cable has been improperly spliced. • Indication of defective supply air temperature sensor, its measuring circuitry or sensor not mounted correctly in unit. • Active alarms AL 103 or AL 104 (if CIM 5 software). • Temperature sensor reading is out of valid range: -50°C (-58°F) or above +100°C (+212°F). • Difference between Tsup1 and Tsup2 is larger than 1°C: 1°C difference for more than 30 min. up to 10°C difference in more than 3 min.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly. 3. If alarms AL 103 or AL 104 are active, check their trouble shooting first. 4. Check that both sensors, Tsup1 and Tsup2 are mounted correct in the supply air pockets. 5. Disconnect the sensor cable for sensor Tsup1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet. 6. Measure the resistance between the two wires. If the resistance is out of range, see "Temperature sensor - resistance table", the temperature sensor and cable are defective and should be replaced.					
Criteria	Value is below alarm limit -50°C (-58°F) or above +100°C (+212°F) or difference between Tsup1 and Tsup2 is more than 1°C (1,8°F) for 30 min. Value invalid for 30 sec. for alarm activation.					
Controller action	Replacement by new value from AAS system.					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Deteriorated control precision in Chill mode.					
Elimination	When sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Detection/error 1 = Max limit 2 = Min limit 5 = Relations 6 = Connection 7 = Derivatives 8 = Ventilation mode	Low limit	High limit	Actual value		

<table>
<tr><th>108</th><th colspan="5">Tsup 2 invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Supply air temperature sensor 2 invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 106 or AL 107 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).
• Difference between Tsup1 and Tsup2 is larger than 1°C:
1°C difference for more than 30 min. or up to 10°C difference in more than 3 min.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 106 or AL 107 are active, check their trouble shooting first.
4. Check that both sensors, Tsup1 and Tsup2 are mounted correct in the supply air pockets.
5. Disconnect the sensor cable for sensor Tsup2 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
6. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value is below alarm limit -50°C (-58°F) or above +100°C (+212°F) or difference between Tsup1 and Tsup2 is more than 1°C for 30 min. or up to 10°C difference. Value invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Replacement by new value from AAS system.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Deteriorated control precision in Chill mode.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit
5 = Relations
6 = Connection
7 = Derivatives
8 = Ventilation mode</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>111</th><th colspan="5">Tusda 1 out of range</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">USDA 1 temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 109 or AL 110 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 109 or AL 110 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tusda1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Activated by UWS.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If cold treatment (CT) is activated, it will be affected.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm is not active even if the sensor comes in range again. The alarm remains active until the unit has been rebooted (power cycle).</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>114</th><th colspan="5">Tusda 2 out of range</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">USDA 2 temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 112 or AL 113 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 112 or AL 113 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tusda1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Activated by UWS.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If cold treatment (CT) is activated, it will be affected.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm is not active even if the sensor comes in range again. The alarm remains active until the unit has been rebooted (power cycle).</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>117</th><th colspan="5">Tusda 3 out of range</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">USDA 3 temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 115 or AL 116 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 115 or AL 116 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tusda1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Activated by UWS.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If cold treatment (CT) is activated, it will be affected.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm is not active even if the sensor comes in range again. The alarm remains active until the unit has been rebooted (power cycle).</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>120</th><th colspan="5">Tcargo out of range</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Cargo temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 118, AL 119 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 118 or AL 119 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tusda1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Activated by UWS.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If cold treatment (CT) is activated, it will be affected.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm is not active even if the sensor comes in range again. The alarm remains active until the unit has been rebooted (power cycle).</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>123</th><th colspan="5">Tevap invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective evaporator temperature sensor or its measuring circuitry.
• Active alarms AL 121 or AL 122 (if CIM 5 software)
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 121 or AL 122 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tevap from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -50°C (-58°F) or above +100°C (+212°F). Value must be invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Replacement by new value from AAS system.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit
5 = Relations
6 = Connection
7 = Derivatives
8 = Ventilation mode</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>126</th><th colspan="5">Tsuc invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Suction temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective suction temperature sensor or its measuring circuitry.
• Active alarms AL 124 or AL 125 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 124 or AL 125 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tsuc from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -50°C (-58°F) or above +100°C (+212°F). Value must be invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Replacement by new value from AAS system.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Superheat control deactivation.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error
1 = Max limit
2 = Min limit
5 = Relations
6 = Connection
7 = Derivatives
8 = Ventilation mode</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

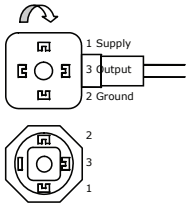
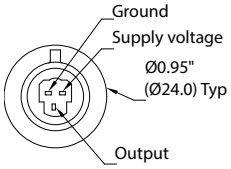
<table>
<tr><th>129</th><th colspan="5">Tamb invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Ambient temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Indication of defective supply ambient sensor or its measuring circuitry.
• Active alarms AL 127 or AL 128.
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. If alarms AL 127 or AL 128 are active, check their trouble shooting first.
4. Disconnect the sensor cable for sensor Tamb from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -50°C (-58°F) or above +100°C (+212°F). Value must be invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Replacement by new value from AAS system.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">No consequence as to control.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm inactive after power cycle.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error:
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>132</th><th colspan="5">Tpump invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Temperature sensor Tpump or its cable is defective.
• Temperature sensor reading is out of valid range:
Below -35°C (-31°F) or above +130°C (+266°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. Disconnect the sensor cable for sensor Tpump from the connector on the controller module, according to the wiring schematic inside the control cabinet.
4. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reading below -35°C (-31°F) or above +130°C (+266°F).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">It is not possible to control the heating element in the vacuum pump.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm to inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/error:
1 = Max limit
2 = Min limit</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

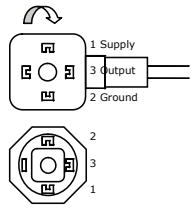
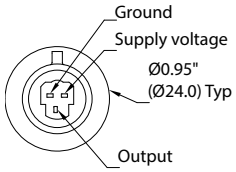
<table>
<tr><th>148</th><th colspan="5">Tsup error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Supply air temperature error.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Tsup1 and Tsup2 deviates too much.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. Check trouble shooting information for AL 105 and AL 108.</td></tr>
<tr><td>Criteria</td><td colspan="6">Difference between Tsup1 and Tsup2 integrated to more than 30°C_min, e.g. 1°C for 30 minutes, 6°C for 5 minutes or 30°C for 1 minute.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">No control action.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Deteriorated control precision in Chill mode.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Tsup1</td><td>Tsup2</td><td>Tevap</td><td>Tret</td><td colspan="2"></td></tr>
</table>

5.4 Pressure transmitter alarms (AL 2XX)

202	Pdis unrealistic					Alarm
Description	Tc value is above the limit that is realistic for the system.					
Cause	• Connector for high pressure transmitter X22. • Cable has been improperly spliced.					
Trouble shooting	1. Ensure screw terminals on X22 are correctly tightened and connected. Disconnect and reconnect the controller plug X22. 2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.					
Criteria	Tc > 80 °C for more than 30 seconds.					
Controller action						
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Unit stops.					
Elimination	Unit restarts after 30 seconds when sensor value is in a realistic range. Alarm is marked as inactive in the alarm list and may then be deleted.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Actual Tc	Actual Tret	Actual Tamb			

203	Pdis invalid				Alarm
Description	Compressor discharge pressure transmitter invalid.				
Cause	• Unexpected behaviour in old software version. • Cable has been improperly spliced. • Indication of defective compressor discharge pressure transmitter or its measuring circuitry. • Connector for high pressure transmitter Pdis not correctly mounted. • High pressure transmitter Pdis defective. • Cable for high pressure transmitter Pdis defective. • Check Schrader valve. • X22 and cable is defective. • Main controller defective.				
Trouble shooting	1. Compare pressure in display with service gauge. Disconnect the cable for Pdis from the main controller according to the wiring schematics inside the control cabinet and from the HP transmitter. 2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly. 3. Try to correct the error by uploading the latest software version to the controller. 4. Check that the connector is mounted correctly according to the drawing for pressure transmitter AKS or NSK respectively. The earth stud must be on the opposite side of the cable (AKS):   Figure for AKS Figure for NSK 5. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable. 6. Mount the cable for Pdis in controller cabinet and on the transmitter. Disconnect signal wire on main controller. Measure voltage between wire and GND on main controller. AKS: If voltage is below 0.5 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.5 V DC and 4.5 V DC, continue to 6. NSK: If voltage is below 0.37 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.37 V DC and 4.0 V DC, continue to 6. 7. Mount signal wire. Measure voltage between SIGNAL and GND. AKS: If voltage is between 0.5 V DC and 4.5 V DC and this alarm is still active, replace main controller. NSK: If the voltage is between 0.37 V DC and 4.0 V DC and this alarm is still active, replace main controller.				
Criteria	Value below alarm limit 0.1 BarE (2 Psi) or above 30/31.9 BarE (435/462 Psi). Value invalid for 30 sec. for alarm activation.				
Controller action					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence					
Elimination	When transmitter value becomes valid, it is marked as inactive in alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.				
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5
	Detection/error 1 = Max limit 2 = Min limit 8 = Internal sensor diagnostics	Low limit	High limit	Actual value	

<table>
<tr><th>206</th><th colspan="5">Psuc unrealistic</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">T0 value is below the limit that is realistic for the system.</td></tr>
<tr><td>Cause</td><td colspan="6">• Connector for low pressure transmitter X22.
• Cable has been improperly spliced.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Ensure screw terminals on X22 are correctly tightened and connected. Disconnect and reconnect the controller plug X22.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.</td></tr>
<tr><td>Criteria</td><td colspan="6">T0 < -65 °C for more than 30 seconds.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Compressor is slowed down and only operating at 20 Hz.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value is in a realistic range, it is marked as inactive in the alarm list and may then be deleted. Value must be valid for 30 sec. to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Actual T0</td><td>Actual Tret</td><td>Actual Tamb</td><td></td><td colspan="2"></td></tr>
</table>

207	Psuc invalid				Alarm
Description	Compressor suction pressure transmitter invalid.				
Cause	• Unexpected behaviour in old software version. • Cable has been improperly spliced. • Indication of defective compressor suction pressure transmitter or its measuring circuitry. • Connector for suction pressure transmitter Psuc not correctly mounted. • Suction pressure transmitter Psuc defective. • Cable for suction pressure transmitter Psuc defective. • Check Schrader valve. • X22 and cable is defective. • Main controller defective.				
Trouble shooting	1. Compare pressure in display with service gauge. Disconnect the cable for Psuc on the main controller according to the wiring schematics inside the control cabinet and from the suction pressure transmitter. 2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly. 3. Try to correct the error by uploading the latest software version to the controller. 4. Check that the connector is mounted correctly according to the drawing for pressure transmitter AKS or NSK respectively. The earth stud must be on the opposite side of the cable (AKS):  Figure for AKS  Figure for NSK 5. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable. 6. Mount the cable for Psuc in controller cabinet and on the transmitter. Disconnect signal wire on main controller. Measure voltage between wire and GND on main controller. AKS: If voltage is below 0.5 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.5 V DC and 4.5 V DC, continue to 6. NSK: If voltage is below 0.37 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.37 V DC and 4.0 V DC, continue to 6. 7. Mount signal wire. Measure voltage between SIGNAL and GND. AKS: If voltage is between 0.5 V DC and 4.5 V DC and this alarm is still active, replace main controller. NSK: If the voltage is between 0.37 V DC and 4.0 V DC and this alarm is still active, replace main controller.				
Criteria	Value below alarm limit -0.9 BarE (-13 Psi) or above 11.8 BarE (171 Psi). Value invalid for 30 sec. for alarm activation.				
Controller action					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence					
Elimination	When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.				
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5
	Detection/error 1 = Max limit 2 = Min limit 8 = Internal sensor diagnostics	Low limit	High limit	Actual value	

<table>
<tr><th>214</th><th colspan="6">Pmem invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="7">Vacuum pump pressure transmitter invalid.</td></tr>
<tr><td>Cause</td><td colspan="7">• Unexpected behaviour in old software version.
• Cable has been improperly spliced.
• Connector for pressure transmitter Pmem not correctly mounted.
• Vacuum pump pressure transmitter Pmem defective.
• Cable for vacuum pump pressure transmitter Pmem defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="7">1. Try to correct the error by uploading the latest software version to the controller.
2. Inspect the sensor cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
3. Check the resistance on contactor coil K9 and K10 between A1 and A2.
Schneider (grey type) coil resistance is 6-8 Ω
Schneider (green type) coil resistance is 8-10 Ω
Danfoss coil resistance is 5-6 Ω
4. Check that the connector is mounted correctly according to the wiring diagram.
a. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable.
b. Disconnect signal wire on controller module according to wiring schematic. Measure voltage between signal wire and GND on controller module according to wiring schematic.
If voltage is below 0.2 V DC, transmitter or connection between transmitter and cable is defective.
If not, then mount signal wire. Measure voltage between SIGNAL and GND.
If voltage is between 0.2 V DC and 4.7 V DC and this alarm is still active, then check the connector X23 on the controller.</td></tr>
<tr><td>Criteria</td><td colspan="7">Pmem out of range for more than 30 sec.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="7"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td colspan="2">Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="7"></td></tr>
<tr><td>Elimination</td><td colspan="7">When the transmitter value becomes valid, the alarm is inactive and can be deleted. Value must be valid for 60 sec. to set alarm to inactive.</td></tr>
</table>

5.5 Other sensor alarms (AL 3XX)

302	RH invalid					Alarm
Description	Relative humidity sensor invalid.					
Cause	• Unexpected behaviour in old software version. • Indication of defective relative humidity sensor or its measuring circuitry. • Relative humidity sensor RH or cable defective. • X10 cable is defective. • Main controller defective.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Disconnect the cable for RH on the main controller according to the wiring schematics inside the control cabinet and from the RH sensor. 3. If the cable by inspection is defective, replace cable. 4. Dismount the sensor from the cable. Dismount the cable terminals from the controller. Measure the resistance between the terminals at the controller end. If the resistance is less than 230 Ω, the cable is defective and must be replaced. 5. Mount the cable for RH in controller cabinet and on the sensor. Disconnect signal wire on main controller. Measure voltage between wire and GND on the main controller. If voltage is below 0.5 V DC, sensor or connection between sensor and cable is defective. If voltage is between 0.5 V DC and 10 V DC, continue to 5. 6. Mount signal wire. Measure voltage between SIGNAL and GND. If voltage is between 0.5 V DC and 10 V DC and this alarm is still active, replace main controller.					
Criteria	Value below alarm limit 10% RH or above 110% RH. Value invalid for 120 sec. for alarm activation.					
Controller action						
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Dehumidification impossible.					
Elimination	When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted. Value must be valid for 120 sec. to set alarm inactive.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Error type 1 = Max value exceeded 2 = Min value exceeded 4 = Modbus comm error	Low limit	High limit	Actual value		

<table>
<tr><th>303</th><th colspan="5">AirEx invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Air exchange sensor short circuit.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of a loose connection, defective or lack of air exchange sensor.
• AirEx is out of calibration.
• Air exchange sensor AirEx or cable defective.
• X23 cable is defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If the cable by inspection is defective, replace cable.
3. Calibrate the air exchange see “Calibration of air exchange sensor”. If the value shown in controller is wrong or alarm still active then disconnect the cable for AirEx on the main controller according to the wiring schematics inside the control cabinet and from the AirEx sensor.
4. Mount the cable for AirEx in controller cabinet and on the sensor. Disconnect signal wire on main controller. Measure voltage between wire and GND on the main controller. If the voltage is over 4.0 V DC, sensor or connection between sensor and cable is defective. If the voltage is between 0.2 V DC and 4.0 V DC, continue to 5.
5. Mount signal wire. Measure voltage between SIGNAL and GND. If the voltage is between 0.2 V DC and 4.0 V DC and this alarm is still active, replace the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value above alarm limit 225 m^3/hour.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>306</th><th colspan="5">HPS switch - K1</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">High pressure switch is active.</td></tr>
<tr><td>Cause</td><td colspan="6">• Discharge pressure is too high and the high pressure switch off.
• High pressure due to:
- Ambient temperature is over spec. limit +50°C (+122°F).
- Condenser blocked.
- Condenser fan motor is not running or wrong direction.
- Manual valve after compressor closed.
- HP pipe damaged.
• High pressure switch or cable is defective.
• X15 cable is defective.
• K1 contactor defective.
• Wrong pressure transmitter configuration in relation to transmitter type.
• Pressure transmitter defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. The unit uses cooling refrigerant R134a or R513A and it is very difficult to operate at temperatures above specification.
2. If condenser coil is blocked, clean the condenser coil to secure any residues is removed. It is critical that the condenser is free from fouling and/or dust and there is no limitation for air to go to and from the condenser. If no failure are found and extra cooling is needed water can be sprayed on the condenser inlet bottom up or if unit has water cooling installed then use the water cooler for extra cooling down.
3. Check that the condenser fan is running forward see arrows on unit.
4. If not running - Check that there are no alarm for the condenser fan motor, AL 402 and AL 426. Also that the fan can rotate freely.
5. If the pressure rises very quickly after start of the compressor, check that the valve after the compressor (discharge side) is not closed or only partially open. Make sure valve is fully open.
6. Check that there are no damages to the pipes after the compressor. Repair if they are damaged and check refrigerant level.
7. Disconnect the cable for high pressure switch on the main controller according to the wiring schematics inside the control cabinet.
8. Measure the voltage between the two connectors for the high pressure switch on the connector PCB. If the voltage is below 15 V AC, measure resistance of compressor/FC contactor coil Danfoss (± 5-6 Ω) / Schneider (± 8-10 Ω) / ABB (± 11-13 Ω)
9. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable and high pressure switch.
10. Check if pressure transmitter is according to “Configuration:” (F08) and set controller according to transmitter type AKS/NSK. Check with gauge that pressure transmitter is giving right value in controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pressure is above high pressure switch safety limit. Cut – out: 22.5 BarE ± 0.7 Bar (326.3 psi ± 10.2 psi), Cut-in: 15.9 BarE ± 0.7 Bar (230.6 psi ± 10.2 psi).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Frequency controller is stopped and unit stops.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Unit restarts after 5 min. When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted. Value must be valid for 60 sec. to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Pdis 6 sec</td><td></td><td>Psuc 6 sec</td><td colspan="2">FCtemp 6 sec</td></tr>
</table>

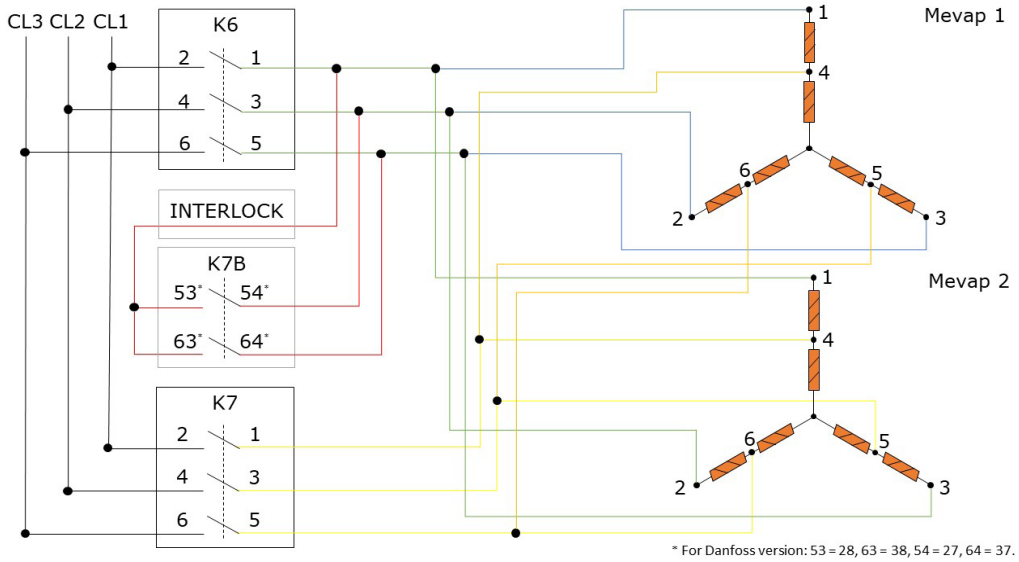
<table>
<tr><th>310</th><th colspan="5">CO_2 sensor invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">CO_2 sensor communication missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Communication with CO_2 sensor.
• Defective CO_2 sensor.
• COMRH cable, RH-cable and/or COMCA cable is defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. To ensure correct troubleshooting and to prevent unnecessary replacements, ensure that the controller is running the latest software version - before proceeding to step 2.
2. Verify that the sensor is mounted correctly and that all cables are in good shape.
3. Verify cable connections between controller and sensor (according to the wiring diagram on the controller door).
4. Verify correct supply voltage (10-14V DC) to the sensor between pin 1 and pin 4 on connector X10.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication with CO_2 sensor not possible for min. 2 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">CA: Start membrane pump
AV+: -</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">CO_2 level can not be regulated.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/ error:
1 = Max limit
2 = Min limit
8 = Internal sensor diagnostics</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

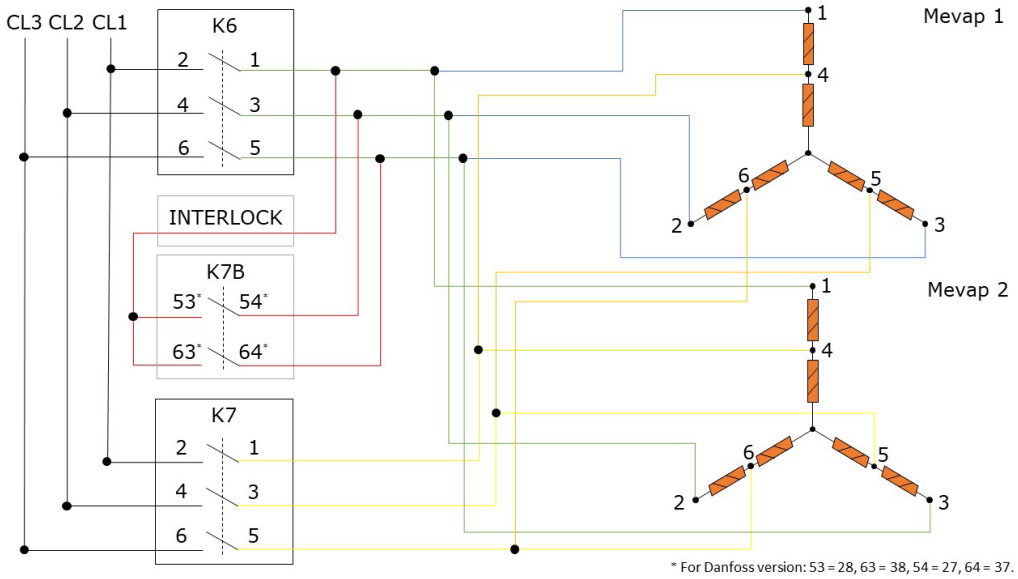
<table>
<tr><th>313</th><th colspan="5">O_2 sensor invalid</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">O_2 sensor communication missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Communication with O_2 sensor.
• COMRH cable, RH-cable and/or COMCA cable is defective.
• Defective O_2 sensor.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. To ensure correct troubleshooting and to prevent unnecessary replacements, ensure that the controller is running the latest software version - before proceeding to step 2.
2. Verify that the sensor is mounted correctly and that all cables are in good shape.
3. Verify cable connections between controller and sensor (according to the wiring diagram on the controller door).
4. Verify correct supply voltage (10-14V DC) to the sensor between pin 1 and pin 4 on connector X10.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication with O_2 sensor not possible for min. 2 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Open air exchange 4%.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">O_2 level can not be regulated.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Detection/ error:
1 = Max limit
2 = Min limit
8 = Internal sensor diagnostics</td><td>Low limit</td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>314</th><th colspan="5">Replace CO_2 sensor</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Replace CO_2 sensor.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• CO_2 measurement after calibration (PTI) is out of range.
• Sensor measurement out of range from last PTI (calibration) and CA/AV+ is active.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Replace CO_2 sensor with new.</td></tr>
<tr><td>Criteria</td><td colspan="6">After a passed PTI test, the CO_2 measurement value should be between -0.26% and 0.34%.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Alarm.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, the alarm is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>CO_2 meas</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

315	Replace O_2 sensor					Warning
Description	Replace O_2 sensor.					
Cause	• Unexpected behaviour in old software version. • O_2 measurement after calibration (PTI) is out of range. • Sensor measurement out of range from last PTI (calibration) and CA/AV+ is active. • Only active when CA/AV+ is active.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Replace O_2 sensor.					
Criteria	After a passed PTI test, the O_2 measurement value should be between 20,4% and 21,4%.					
Controller action	Alarm.					
	Log	X	Alarm	X	Alarm light	Off
Consequence						
Elimination	When the sensor value becomes valid, the alarm is marked as inactive in the alarm list and may then be deleted.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	O_2 meas					

5.6 Power alarms (AL 4XX)

400	Mevap 1 overheat				Fatal alarm
Description	Evaporator motor 1 overheat.				
Cause	• Unexpected behaviour in old software version. • Indication of an overheated motor or a loose thermistor cable connection. • Damage on cable for Mevap 1. • Cable for measuring evaporator motor 1 overheat defective. • Evaporator motor 1 defective.				
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Disconnect the motor plug and inspect if the cable's female plug has been damaged, deformed, or enlarged which can cause the bad connection between plug and motor. Repair or replace if necessary. 3. Check that plug X26 on the main controller is connected properly and screws are correctly tightened. 4. Turn the unit off! Open inspection hatch and see if the evaporator fan can turn freely. If it cannot turn, remove any ice. 5. Check the Mevap 1 cable plug is fully inserted into the motor. 6. Check the continuity in the Mevap 1 cable between the plug and the control box. 7. If the motor is hot, it may be overloaded and jammed or defective. 8. Measure the fan motor at the connector according to below: Terminal 1,2 and 3 should all read the same value (example 300 Ohm). Terminal 4, 5 and 6 should read half the value of the low speed (150 Ohm). If not, connector or motor is defective. Replace motor.  				
Criteria	Value above high alarm limit 10K Ohm.				
Controller action	Both evaporator fan motors stop.				
	Log	X	Alarm	X	Alarm light	Quick flash
Consequence	Air circulation in container stops causing unit to stop.				
Elimination	When overheating disappears, alarm will be marked as inactive in alarm list and may then be deleted. Control is again released, but fan motors will only be allowed to operate at low speed for the first 5 min. If the error does not reoccur, problem will be considered solved and evaporator fan high speed is again released.				
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5
			High limit	Actual value	

<table>
<tr><th>401</th><th colspan="5">Mevap 2 overheat</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator motor 2 overheat.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of an overheated motor or a loose thermistor cable connection.
• Damage on cable for Mevap 2.
• Cable for measuring evaporator motor 1 overheat defective.
• Evaporator motor 2 defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Disconnect the motor plug and inspect if the cables female plug has been damaged, deformed, or enlarged which can cause the bad connection between plug and motor. Repair or replace if necessary.
3. Check that plug X26 on the main controller is connected properly and screws are correctly tightened.
4. Turn the unit off! Open inspection hatch and see if the evaporator fan can turn freely. If it cannot turn, remove any ice.
5. Check the Mevap 2 cable plug is fully inserted into the motor.
6. Check the continuity in the Mevap 2 cable between the plug and the control box.
7. If the motor is hot, it may be overloaded and jammed or defective.
8. Measure the fan motor at the connector according to below:
 

* For Danfoss version: 53 = 28, 63 = 38, 54 = 27, 64 = 37.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value above high alarm limit 10K Ohm.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Both evaporator fan motors are stopped.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Air circulation in container stops causing unit to stop.</td></tr>
<tr><td>Elimination</td><td colspan="6">When overheating ceases, alarm will be marked as inactive in alarm list and may then be deleted. Control is again released but fan motors will only be allowed to operate at low speed for the first 5 min. If error does not reoccur, problem will be considered solved and evaporator fan high speed is again released.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td>High limit</td><td>Actual value</td><td colspan="2"></td></tr>
</table>

402	Mcond overheat	Fatal alarm
Description	Condenser motor overheat.	
Cause	• Unexpected behaviour in old software version. • Indication of an overheated motor or a loose thermistor cable connection. • Condenser motor defective. • Cable for measuring condenser motor overheat defective. • Main controller defective.	
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Disconnect the motor plug and inspect if the cables female plug has been damaged, deformed, or enlarged which can cause the bad connection between plug and motor. Repair or replace if necessary. 3. Turn the unit off. See if the condenser fan can turn freely. If it cannot turn, replace the motor. If the motor is hot, it may be overloaded and jammed or defective. 4. If the cable for McondOH by inspection is defective, if unable to repair cable, replace it. 5. Disconnect the cable for Mcond on the main controller according to the wiring schematics inside the control cabinet. 6. Measure the resistance in the cable. If the resistance is more than 1 MΩ, the cable or the motor is defective and should be replaced. If the resistance is less than 5 kΩ, the cable and motor should be OK. 7. Turn unit on again. Measure the voltage across the connector for Mcond. It should be between 4.80 V DC and 5.20 V DC. a. If the voltage is inside the above range, connect sensor again. Measure the voltage across the thermistor and check the voltage. If the voltage is less than 2.5 V DC, the measurement is OK. If the alarm after 30 sec. is still active in the display, the main controller is defective - replace the main controller. b. If the voltage is outside the range, main controller is defective or another error might affect the voltage. Check other alarms before replacing main controller.	
Criteria	Value above top alarm limit 10K Ohm.	
Controller action	Condenser fan motor is stopped.	
	Log: X	Alarm: X	Alarm light: Quick flash
Consequence	Air circulation in container stops causing unit to stop.	
Elimination	When overheating disappears, alarm will be marked as inactive in alarm list and may then be deleted. Control is again released, but fan motor will only be allowed to operate at low speed for the first 5 min. If the error does not reoccur, problem will be considered solved and condenser fan high speed is again released.	

403	Mpump overheat					Alarm
Description	Vacuum pump motor overheat.					
Cause	• Unexpected behaviour in old software version. • Loose thermistor cable connection. • Vacuum pump motor defective. • Cable for measuring vacuum pump motor overheat defect. • Controller module defective.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Disconnect the motor plug and inspect if the cables female plug has been damaged, deformed, or enlarged which can cause the bad connection between plug and motor. Repair or replace if necessary. 3. Turn the unit off. Take the fan cover of the vacuum pump off to see if the fan can turn freely. If not, perform oil check. See trouble shooting AL 656. If the motor is hot, it may be overloaded and jammed or defective. 4. Inspect the cable for Mpump, including the pin positions on both connector and pump side, and replace if defective or impossible to fix. 5. Disconnect the cable for Mpump from the controller module (X14) and check for corrosion and correct torque. 6. Measure the resistance in the cable. If the resistance is more than 1 MΩ, the cable or the motor is defect and should be replaced. If the resistance is less than 5 kΩ, the cable and motor should be OK. 7. Turn the unit on again. Measure the voltage over the Mpump connector X14. It should be between 3.2V DC and 3.4V DC. a. If the voltage is inside the above range, connect the sensor again. Measure the voltage over the sensor and check the voltage. If the voltage is less than 2.5 V DC, the measurement is OK. If the alarm after 30 sec. is still active on the display, the controller module is defect. Replace the controller module. b. If the voltage is outside the range, the controller module is defect or another error might affect the voltage. Check other alarms before replacing the controller module.					
Criteria	Value above high alarm limit 10k Ohm.					
Controller action	Vacuum pump is stopped until alarm is removed.					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Extraction of CO_2 is stopped.					
Elimination	When overheating stops, the alarm will be marked as inactive in the alarm list and may then be deleted.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
		Low limit	High limit	Actual value		

<table>
<tr><th>415</th><th colspan="5">Invalid power sup</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">U1-2 and U1-3 and U2-3 over voltage.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of error in container supply voltage between phases.
• The unit is supplied with a voltage above specified level.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Measure the voltage applied to the unit.
3. Apply correct voltage to the unit.
4. The FC will be destroyed if it is running at a too high voltage.
5. Measure the actual voltage and compare with the value in the display. If the measurement differs the power module PCB may be defective. Replace or bypass power module PCB by pressing (wrench) selecting the Configuration menu, then phase direction and then cw. If condenser fan rotates in the wrong direction, choose ccw. This action is to be performed at every unit start up.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value above top alarm limit 535/560 Volt.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Controller breaks supply after 60 sec. After 30 sec. the unit restarts with a normal startup procedure.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive if another phase voltage measuring is below limit. It may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Limit</td><td>U1-2</td><td>U2-3</td><td>U1-3</td><td colspan="2">NetFreq</td></tr>
</table>

<table>
<tr><th>418</th><th colspan="5">Invalid power sup</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">U1-2 and U1-3 and U2-3 under voltage.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of error in container supply voltage between phases.
• The unit is supplied with a voltage below specified level.
• Defective Power module PCB.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Measure the voltage applied to the unit.
3. Apply correct voltage to the unit.
4. The FC will not be able to maintain stable speed of the compressor motor due to a too low voltage and therefore the unit will make a restart.
5. Measure the actual voltage and compare with the value in the display. If the measurement differs the power module PCB may be defective. Replace or bypass power module PCB by pressing selecting configuration then phase direction and then cw. If condenser fan rotates in the wrong direction, choose ccw. This action is to be performed at every unit start up.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below low alarm limit 300 Volt.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Controller breaks supply after 60 sec. After 30 sec. the unit restarts with a normal startup procedure.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive if another phase voltage measuring is above limit. It may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Limit</td><td>U1-2</td><td>U2-3</td><td>U1-3</td><td colspan="2">NetFreq</td></tr>
</table>

<table>
<tr><th>421</th><th colspan="5">Over current</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">I1-2 and I1-3 and I2-3 over current.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of short circuit in electric installations of Star Cool unit.
• The unit is using too much power on one phase.
• Defective Power module PCB.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. The voltage may have been too low for too long.
3. Check power cables for short circuits and damages.
4. Check cables for heaters and motors for short circuits and damages.
5. Measure the actual current and compare with the value in the display. If the measurement differs, the power module PCB may be defective. Replace or bypass power module PCB by pressing (wrench) selecting configuration then phase direction and then cw. If condenser fan rotates in the wrong direction, choose ccw. This action is to be performed at every unit start up.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value above upper alarm limit 20 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Limit</td><td>I1</td><td>I2</td><td>I3</td><td colspan="2">Ifc</td></tr>
<tr><td>Info</td><td colspan="6">This alarm is used for service purposes. The fuses are protecting the unit.</td></tr>
</table>

<table>
<tr><th>423</th><th colspan="5">No phase direction</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">Phase direction not detectable.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Phases may be lacking or there may be extremely high noise in one or more phases in the detection moment.
• The unit is supplied with an unstable voltage.
• The power frequency is out of specified range.
• Defective Power module PCB.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if voltage on all 3 phases is within specified range.
3. Verify that power frequency is within specified range.
4. Check/replace power module PCB.
5. If 1-4 are OK, then replace the main controller or set the correct phase direction on the Configuration menu, line F05 to clockwise or counterclockwise.</td></tr>
<tr><td>Criteria</td><td colspan="6">Impossible to detect phase sequence in power supply.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Unit does not start up.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when phase sequence can be established. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>424</th><th colspan="5">Power frequency</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Phase frequency error.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of error on StarCool unit power supply.
• The unit is supplied with an unstable voltage.
• The power frequency is out of specified range.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if voltage on all 3 phases is within specified range.
3. Verify that all 3 phases are applied to the unit and for example not just 2 phases.
4. Verify that power frequency is within specified range.
5. Apply correct voltage to the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value out of limits. Power frequency must be between 42.5 Hz and 62.5 Hz.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">None</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">At very low frequencies this error will lead to AL 423. Otherwise, normal operation can take place; The measuring system, however, will perform badly.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power frequency within range again.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Frequency</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>425</th><th colspan="5">Frequency too high</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">Power frequency too high warning.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Power generator adjusted to too high frequency.
• The power frequency is out of specified range.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Adjust the frequency of the power generator to a lower frequency.
3. Verify that power frequency is within specified range.
4. Apply correct voltage to the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Power frequency above 70 Hz.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Unit stop flag.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Reduced capacity of unit.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power frequency within range again.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Frequency</td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>430</th><th colspan="5">Cpr connection</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Power cable from FC to compressor is faulty.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of error with power cable between FC and compressor. The compressor is not using any power.
• The power cable between the FC and the compressor motor is defective.
• The current measuring circuit in the FC is faulty.
• The compressor motor is damaged.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if supply voltage on all 3 phases is within specified range.
3. Check that the power cable between the FC and the compressor motor is not damaged.
4. Measure that the compressor motor is not damaged.
5. The FC may be defective.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC is running but the current draw less than 0,5A from the FC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Controller will retry after 1 min.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Fact</td><td>Idc</td><td></td><td colspan="2"></td></tr>
</table>

5.7 Frequency converter (FC) alarms (AL 5XX)

For some of the alarms in this section, the FC may be faulty and must be replaced. For continuing operation until replacement is possible, the unit can be rewired and started for emergency operation: See “Emergency Operation” in the Operating and Service Manual.

<table>
<tr><th>501</th><th colspan="5">FC local control</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC setting in Local mode.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable FC-com periodically defective.
• Internal fault in the FC.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check that the cable FC-com is connected and not damaged.
3. If the alarm is then still active, the FC is defective and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC in the local mode.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when local mode is reset on frequency converter. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>508</th><th colspan="5">Compr connection</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC short circuit.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Short-circuit on the FC power output.
• Damaged cable and/or plugs.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. There is a short-circuit on the compressor motor (Mcpr) terminals or in the motor. Check the cable and replace if it is defective.
Compressor coil resistance:
V-Y 1.15 Ω
U-X 1.15 Ω
W-Z 1.15 Ω
Also ensure to check to ground
Meggering:
Value above 5 MΩ = OK
Value below 5 MΩ = Remove terminal block and measure again on windings directly.
a. If still below, replace compressor.
b. If above replace terminal block only.
3. The FC is defective and must be replaced. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Short circuit in compressor or its terminals. Motor current has been above 40 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC, and can then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>509</th><th colspan="5">FC 24 V fault</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC internal 24 V supply fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Internal fault in the FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Switch off the unit and wait 10 min. before switching on the unit again.
3. If the alarm is then still active, the FC is defective and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Internal 24 V supply error.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>510</th><th colspan="5">Compr connection</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC earth fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Isolation damaged on the FC power output to the compressor.
• Defective FC.
• Damaged cable and/or plugs.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. The power cable for the compressor motor (Mcpr) may have defective isolation. Check the cable and replace if it is defective.
3. Measure resistance phase to ground (must be above 2 MΩ).
4. The FC is defective and must be replaced. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Leakage current from phase to ground of FC. Current 10 A for more than 3 ms.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>511</th><th colspan="5">Compr over current</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Compressor over current.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Unstable power supply (Generator/Genset).
• The compressor motor draws too much current.
• Defective motor cable, compressor or FC.
• Condenser blocked due to dirt and residue.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to upload the latest software version to the controller.
2. If “Wait – Adapting to genset” is shown in display, unit is adapting to an unstable power supply. Wait until adjustment is completed.
a. When “Wait – Adapting to genset” is no longer displayed and compressor is stuck on 60 Hz, find a better power supply.
c. Rewire to emergency operation until a better power supply can be connected, to avoid FC alarms.
3. Turn off unit and wait 10 min. before turning on the unit again.
4. If the compressor cannot run or runs very short time before this alarm comes again, the compressor, motor cable or terminal block is defective and must be replaced.
5. If the compressor can run several min. without alarm, the motor cable, terminal block or FC may be defective and must be replaced if the alarm comes again.
6. Clean condenser.
7. Rewire the FC for emergency operation until a better power source can be found. See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC overloaded. Current above 38 Amp for approx. 1 sec.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>513</th><th colspan="5">Compr overload</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Compressor overload.</td></tr>
<tr><td>Cause</td><td colspan="6">• The FC cannot deliver enough power to the compressor.
• Cable not mounted correcly or defect.
• Compressor terminal block high resistance due to corrosion.
• Insufficient cooling for the FC.
• Defective compressor.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. At very high ambient temperatures and very low setpoint temperatures, the FC may get too hot to generate enough power. Therefore it can be cooled by the refrigerant in the compressor.
2. Check refrigerant level + Veco operation.
3. Check that all bolts fixing the FC to the compressor are properly tightened and nothing is jammed between the FC and the compressor.
4. Impedance measured on FC terminals:
U-V 0.7 Ω V-W 0.7 Ω W-U 0.7 Ω if resistance is not equal go to 4.
5. Check the motor cable and replace it if it is defective. Clean both FC + Compressor surface. Tighten bolts properly for better cooling (Apply thermo paste if available).
6. Compressor coil resistance:
V-Y 1.1 Ω U-X 1.1 Ω W-Z 1.1 Ω
Also ensure to check to ground
Meggering:
Value above 5 MΩ = OK
Value below 5 MΩ = Remove terminal block and measure again, directly: the compressor
If value still below, replace compressor
If above replace terminal block (only).
7. The compressor is wearing down and drawing increasingly power from the FC.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor overloaded. Current has been above 24 Amp for 20 sec.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 1.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">The FC will be restarted after 10 min. Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>514</th><th colspan="5">Invalid power supply</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC undervoltage fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• The FC is supplied with too low voltage for continuous operation.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Supply unit with correct power voltage according to specification.
3. If voltage is within specification and not unstable, the FC may be defective and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Supply voltage to FC is less than 330 V AC with full load. The minimum voltage depends on the load of the FC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC shut-down.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>515</th><th colspan="5">Invalid power supply</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC overvoltage fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• The FC is supplied with too high voltage for continuous operation.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Supply unit with correct power voltage according to specification. The FC will be destroyed at too high voltages and is therefore being shut down.
3. If voltage is within specification and not unstable, the FC may be defective and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Supply voltage of FC is more than 550 V AC (800 V DC).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>516</th><th colspan="5">FC supply error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Power supply error indication.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Unstable power supply (Generator/Genset).
• One or more phases are not applied to the FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to upload the latest software version to the controller.
2. If “Wait – Adapting to genset” is shown in display, unit is adapting to an unstable power supply. Wait until adjustment is completed.
a. When “Wait – Adapting to genset” is no longer displayed and compressor is stuck on 60 Hz, find a better power supply.
3. Verify that all 3 phases are present and voltage is correct.
4. Verify that voltage difference between the 3 phases is less than 20 V AC.
5. Rewire the FC for emergency operation until a better power source can be found. See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC cannot maintain DC filter voltage (or too much ripple in DC voltage). AL 523 has been active for more than 50 sec.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 1.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>517</th><th colspan="5">FC over temp</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC over temperature fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Air gap between FC and compressor.
• Insufficient cooling for the FC.
• Lack of refrigerant.
• Defect Veco valve.
• FC operates at operating limits.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check for refrigerant. Refrigerant level should be visible at sight glass. The FC cooling is, if lack off refrigerant, the first failure.
2. The FC cooling is dependent on a tight and flush mounting on the compressor endshield. A small airgap between compressor and FC will reduce the FC cooling. Follow procedure below:
3. Dismount FC and clean both compressor and FC. Make sure that all 4 “studs” on the compressor are tightened correctly, before mounting the FC again (Even smallest air gap is critical).
4. Check the FC. Motor cable between FC and compressor. The cable may be jammed between FC and compressor.
a. Apply new thermal paste on FC contact area, and mount the FC again.
b. Check that all bolts fixing the FC to the compressor are tightened and nothing is jammed between the FC and the compressor. Heat transfer paste should be used between FC and compressor.
c. If this alarm appears more than once: Dismount FC and check motor cable before mounting the FC again. Tighten bolts properly for better cooling.
5. Check Veco that it can open properly and check controller for burned output to Veco. Eg. activate Veco in manual mode and listen for the “clicksound”.
6. If unit is running in critical situations, the unit can be rewired for emergency operation. See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">FCM 375: temperature exceeds +85°C (+185°F), or above +78°C (+172°F) for more than 15 min.
FC 2.0: temperature exceeds +95°C (+203°F) for more than 15 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops and restarts when FC has cooled down.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>518</th><th colspan="5">FC inrush</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC inrush fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• The FC has had too many restarts within short time.
• CIM5: Manual activation of contactor (K8) on/off too many times.
• CIM6: Manual activation of contactor (K1) on/off too many times.
• Loose power connection for the FC.
• Loose FC-com cable for communication with the FC.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that supply power for the unit is stable and within specification.
3. Check the FC-com cable for damages and loose connection.
4. Check supply power cables for the FC.
5. The FC may be defective and should be replaced. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">May occur if FC is activated too many times during a one minute period (the primary side). FC has been switched on/off more than twice within 1 minute.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 1.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops and restarts after some min.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in the alarm list when reset by the FC. The alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>519</th><th colspan="5">FC internal error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Frequency inverter internal error detected.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. The FC reports an internal failure. See if there should be other FC alarms (AL 5XX) and if they can be deleted first.
3. Turn off the unit for 10 min. and then start again. If this alarm becomes active again, the FC has a permanent internal fault and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Internal error in FC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm reset requires that supply voltage is disconnected from frequency converter. Alarm will be marked as inactive in alarm list when reset by FC. The alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Internal error word low 16 bits</td><td colspan="2">Internal error word high 16 bits</td></tr>
</table>

<table>
<tr><th>523</th><th colspan="5">FC phase loss</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Power supply error indication.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Unstable power supply (Generator/Genset).
• One or more phases are not applied to the FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to upload the latest software version to the controller.
2. If “Wait – Adapting to genset” is shown in display, unit is adapting to an unstable power supply. Wait until adjustment is completed.
a. When “Wait – Adapting to genset” is no longer displayed and compressor is stuck on 60 Hz, find a better power supply
3. Verify that voltage levels are the same for all 3 phases (voltage difference less than 15 V AC).
4. Supply unit with correct power voltage according to ISO Standard.
5. Rewire the FC for emergency operation until a better power source can be found. See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">More than 70 V diff. in min./max. for phases in power supply.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If not solved, this problem can cause FC to stop due to alarm 516.</td></tr>
<tr><td>Elimination</td><td colspan="6">Warning will be marked as inactive in alarm list when reset by FC. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>530</th><th colspan="5">FC alarm undefined</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Unclear error in FC.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC error report.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 0.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">The compressor will not start.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Alarm word low 16 bits</td><td colspan="2">Alarm word high 16 bits</td></tr>
</table>

<table>
<tr><th>531</th><th colspan="5">PCB temperature</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Critical FC PCB temperature.</td></tr>
<tr><td>Cause</td><td colspan="6">• Air gap between FC and compressor.
• Insufficient cooling for the FC.
• Lack of refrigerant.
• Defect Veco valve.
• FC operates at operating limits.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check for refrigerant. Refrigerant level should be visible at sight glass. The FC cooling is, if lack off refrigerant, the first failure.
2. The FC cooling is dependent on a tight and flush mounting on the compressor endshield. A small airgap between compressor and FC will reduce the FC cooling. Follow procedure below:
3. Dismount FC and clean both compressor and FC. Make sure that all 4 “studs” on the compressor are tightened correctly, before mounting the FC again (Even smallest air gap is critical).
4. Check the FC. Motor cable between FC and compressor. The cable may be jammed between FC and compressor.
a. Apply new thermal paste on FC contact area, and mount the FC again.
b. Check that all bolts fixing the FC to the compressor are tightened and nothing is jammed between the FC and the compressor. Heat transfer paste should be used between FC and compressor.
c. If this alarm appears more than once: Dismount FC and check motor cable before mounting the FC again. Tighten bolts properly for better cooling.
5. Check Veco that it can open properly and check controller for burned output to Veco. Eg. activate Veco in manual mode and listen for the “clicksound”.
6. If unit is running in critical situations, the unit can be rewired for emergency operation. See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC PCB temperature exceed 85°C.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">If not solved, this problem can cause FC to stop.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>532</th><th colspan="5">Blocked rotor</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Compressor restart fail.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Compressor motor not turning due to high pressure difference Pdis - Psuc.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to upload the latest software version to the controller.
2. If pressure difference Pdis – Psuc is more than 5 bar, then hot gas might not open, try to open hot gas valve by permanent magnet. Check solenoid coil and/or check controller output.
3. The compressor motor draws too much current from the FC. The compressor motor, compressor piston, the motor cable or terminal block may be jammed or defective.</td></tr>
<tr><td>Criteria</td><td colspan="6">Motor current above 24 Amp for approx. 10 sec</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">After 5 x restart, alarm is given and unit stops after additional 10 restart attempts.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm inactive after power cycle.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

<table>
<tr><th>533</th><th colspan="5">FC comm timeout</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">The FC has tripped and stopped.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Other alarms have tripped (stopped) the FC.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. The FC has tripped due to another AL 5XX alarm and then stopped. See if there should be other FC alarms (AL 5XX) and act accordingly to these.
3. Turn the unit off for 10 min. and then start it again. If this alarm becomes active again, the FC may have an internal fault and must be replaced.
4. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">The FC has stopped due to an error and must be reset.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 2.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">There is no cooling until the FC is ready again. The FC may need to cool down before restarting.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FCTemp</td><td>Fact</td><td>IFC</td><td>Psuc</td><td colspan="2">Pdis</td></tr>
</table>

5.8 Operation alarms (AL 6XX)

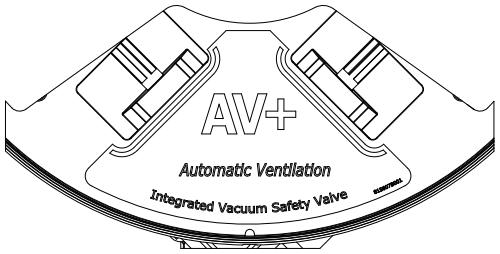
<table>
<tr><th>600</th><th colspan="5">No control sensors</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">Supply air sensor 1, supply air sensor 2, return air sensor, and evaporator sensor are all malfunctioning.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Sensors are malfunctioning.
• X22, X23, X24 and X25 cable are defective.
• Main controller is defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify all other sensor alarms AL 100 to AL 3XX and try to remove these alarms.
3. If this alarm remains active, replace main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">No valid control sensor values.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Unit stop flag.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">When one of the control sensor values enters into the valid area, it is again possible to control container temperature. For reliability reasons at least one of the control sensor values must be valid for 30 sec. before sensor may be used as control reference again.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

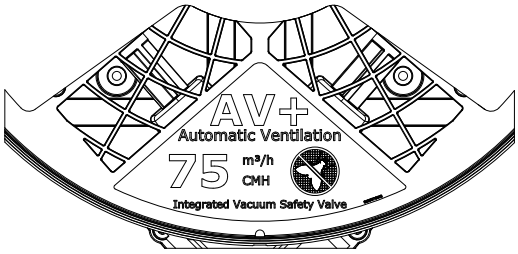
<table>
<tr><th>601</th><th colspan="5">No watercooling</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Water-cooling fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Water cooling selected and no water cooling active.
• Insufficient water cooling capacity.
• If program is chosen, warning can occur in units without water cooling.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that water cooling hoses are applied and water is running when selecting water cooling.
3. Verify that the water is not too hot and not able to be used for cooling the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor discharge temperature exceeds limit for water-cooling, +60°C (+140°F) in more than 1 hour.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list next time water-cooling is activated. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Tc</td><td>WC off</td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>603</th><th colspan="5">In range fault</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">In-range fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Container doors are open or gasket defective.
• Not enough refrigerant for the compressor.
• Incorrect Psuc reading.
• Insufficient airflow through evaporator.
• Insufficient airflow through condenser.
• Defective hot gas valve (leaking).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. The unit will continue the cooling but the next steps could be checked anyway.
2. Try to correct the error by uploading the latest software version to the controller.
3. If other alarms – follow troubleshooting for these alarms.
4. Check container doors and gaskets.
5. If Psuc reads -1 bar (-14.5 psi), check connector at the sensor and at X22 on the controller by disconnecting and reconnecting the connector. If still reading -1 bar (-14.5 psi), compare Psuc reading with the service gauges.
6. Check if there is enough refrigerant in the unit. Check if the evaporator is filled with ice or dirt blocking air circulation. Check if evaporator motors can rotate (turn unit off first).
7. Check if the condenser is filled with dirt and blocking air circulation. Check if condenser motor can rotate (turn unit off first).
8. Check hot gas valve for leaking. Let the compressor run in manual for some time. Stop compressor and see if the suction pressure rises more than normal. If valve is defective, replace valve.</td></tr>
<tr><td>Criteria</td><td colspan="6">Temperature no longer in-range. Has been in range for minimum 30 min. and after that in out-range for more than 4 consecutive hours.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">If error is detected during PTI-test, PTI-test will fail.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when in-range is reached and alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Tset</td><td>Tact</td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>607</th><th colspan="5">AirEx open</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Air exchange valve open in conflict with settings.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Air exchange valve open in freeze mode or CA/AV+ mode.
• Air exchange: RH set point is between 50% and 64%.
• Cable or air exchange sensor defective or not calibrated correctly.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Calibrate the air exchange sensor (see Controller System Menu decal for air exchange sensor calibration).
2. Try to correct the error by uploading the latest software version to the controller.
3. See and clear error for alarm AL 305.
4. Close air exchange. If air exchange is closed, cable for air exchange sensor or sensor is defective see AL 305 for trouble shooting.</td></tr>
<tr><td>Criteria</td><td colspan="6">Air exchange is open while unit being in the frozen mode, dehumidification with set point between 50% and 64%, and or with CA or AV+ running.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Deteriorated control precision.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when air exchange is closed and may then
be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>608</th><th colspan="5">Config AirEx type</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Air exchange type missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Air exchange type is set to NONE in Settings.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Go to Settings and Configuration, and choose either 35m³/h or 75m³/h depending on valve type.

35 m³/h
 

75 m³/h
 
</td></tr>
<tr><td>Criteria</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when air exchange is set and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>610</th><th colspan="5">Defrost time exceed</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Max. defrost time exceeded.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• There has been too much ice in the evaporator.
• The heaters are not working/defective.
• Defective Psuc pressure transmitter.
• Defective Pdis pressure transmitter.
• Defective Tevap evaporator temperature sensor.
• Lack of refrigerant.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check and clear other alarms first. Check refrigerant level.
3. Check pressure transmitter configuration and confirm values from Psuc and Pdis by comparing them to gauge readings.
4. Start a manual defrost time to remove remaining ice now. See if there has been used current for the heaters on the information menu - Current phase 1, 2 and 3 should be above 6 A when the heater symbol, ≅, is shown on the display. If current is lower, check if there is power for the heaters.
5. Run a PTI test after the cargo is unloaded.</td></tr>
<tr><td>Criteria</td><td colspan="6">Defrost time has exceeded 60 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">All the ice may not have been melted with a deteriorated yield.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive when a new defrosting is terminated on temperature and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Max defrost time</td><td></td><td></td><td colspan="2"></td></tr>
</table>

611	Too many sensor errors				Log
Description	Too many (controlling) sensors have errors.				
Cause	• If too many (controlling) sensors have errors, the controller cannot maintain correct temperature. See also “Temperature control” and “Expansion valve control”. • Unexpected behaviour in old software version. • One or more temperature sensors are defective. • One or more pressure transmitters are defective.				
Trouble shooting	1. This alarm only appears when one or more controlling sensors have failure and there are no substitute sensors. 2. Try to correct the error by uploading the latest software version to the controller. 3. See alarm list for the specific sensors.				
Criteria	Can not substitute faulty sensors with value from another sensor.				
Controller action					
	Log	X	Alarm		Alarm light	Off
Consequence	Deteriorated control precision in the frozen mode.				
Elimination	When a sensors slot value enters valid range, it is marked as inactive in alarm list and may then be deleted. Values must be valid for 120 sec. to set alarm inactive.				
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5
	Alarm reason: 1 = T0 Invalid 2 = Tsuc and Tevap invalid 3 = Minimum 3 sensors (Tsup1, Tsup2, Tret, Tevap, Tsuc) invalid				

<table>
<tr><th>623</th><th colspan="5">Loss of cooling</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">The refrigeration systems tries to cool down but Tsup is above Tret.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• System leak – loss of refrigerant.
• Defective compressor valve plate(s).
• Defective compressor.
• Defective valves.
• Evap fan direction.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check refrigerant level. If low, find leak point, repair and recharge unit.
3. Check the function of these valves: Vexp, Veco and Vhg. Perform a function test and troubleshoot according to the test alarms.
4. If the compressor has low performance, isolate the compressor. Recover the refrigerant from the compressor and check LP and HP valve plates for damage. Defective valve plates can be replaced if the bore of the cylinder is not damaged.
5. Replace the defective compressor if replacement of valve plates is not possible or if another part of the compresor is defective.
6. Please check Evap fan motor direction, make sure the wiring is according to the wiring schematic.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor running AND evaporator heaters are off AND Tret is 0.5°C below Tsup AND inrange LED is off AND requested capacity is -100. All above criterias must be true for 120 min. before the alarm is activated.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Unit stop flag.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops until it is power cycled.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Tret</td><td>Tsup</td><td>FCType</td><td>FreqAct</td><td colspan="2">Hevap%</td></tr>
</table>

<table>
<tr><th>624</th><th colspan="5">Config valve type</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">System identifies that the controller was changed.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Controller has been replaced, requires manually setting of valve version (Ver. 1, Ver. 2, Ver. 3).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Manually select the valve version in the Configuration menu on line F09. If in doubt which valve version is installed, please refer to bulletin 00143.</td></tr>
<tr><td>Criteria</td><td colspan="6">It is determined that the controller was changed, when both the user panel and power module serial numbers change in one power down.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Possibility for non-optimal operation.</td></tr>
<tr><td>Elimination</td><td colspan="6">The operator must manually select the valve version in the Configuration menu on line F09.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>630</th><th colspan="5">Manual phase dir</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Manually selected phase direction.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of insufficient yield or defective controller.
• The user has selected a manual phase direction.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. The quality of the power frequency is so poor that the user must decide phase direction. Apply valid power supply to the unit. Ensure condenser fan is running the right direction if no better power supply is available.
3. There is a failure in the power wiring for the unit. Check that there are 3 valid phases for the unit.
4. There is a fault in the phase direction detection circuit. Turn unit off and on again and see if the phase can be detected now. If phases still can not be detected, replace the power measure module spm 100 / spm 200.
5. The main controller is defective. Replace main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">User has manually selected phase direction.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Use the selected phase direction.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">User controls the rotation direction of the motors.</td></tr>
<tr><td>Elimination</td><td colspan="6">When switched to automatic, the alarm is marked as inactive and can be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td>Manual phase dir. CW/CCW</td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>650</th><th colspan="5">O_2 low</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">The O_2 sensor measures low O_2 levels the in container.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• The system is not able to vent fresh air into the container.
• Lack of oil in the vacuum pump.
• Automatic air exchange defect.
• O_2 sensor defect.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See if the automatic air exchange valves are open. If not, try to open them in Manual mode.
3. Check oil level (must be above minimum level).
4. See if the vacuum pump is running.
a. If the pump is running it will, in time, make sure there is enough O_2 in the container. Open the damper to accelerate this, open it until the O_2 level is higher than the O_2 setpoint.</td></tr>
<tr><td>Criteria</td><td colspan="6">O_2 level < O_2 setpoint – 0.3 * O_2 setpoint.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Run pump.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">If not flushed with O_2, the cargo might experience anaerobic respiration and thereby deteriorate.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td>Setpoint</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>651</th><th colspan="5">CO_2 high</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">The CO_2 sensor measures high CO_2 levels in the container.</td></tr>
<tr><td>Cause</td><td colspan="6">• Air exchange motor defective.
• CO_2 sensor defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check valves and air exchange module for obstructions.
2. Check connections according to wiring schematic.
3. Replace CO_2 sensor and run air exchange manually.</td></tr>
<tr><td>Criteria</td><td colspan="6">CO_2 level > CO_2 setpoint + 0.5 * CO_2 setpoint (and rising).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">CA: Open fresh air valve 0-100% (CO2 value is 1,0% above setpoint -> CO2 high limit
AV+: No action</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">If CO_2 is not removed from the container, this will cause damage to the cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td>Setpoint</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>652</th><th colspan="5">Vacuum fault</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump unable to reach the required pressure.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Lack of oil.
• Leak in vacuum system or membrane.
• Defective pressure sensor.
• Vacuum pump is defective.
• Contactor/controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If AL 403 is active, see trouble shooting for AL 403.
If AL 652 does not turn inactive, proceed with 3.
3. The vacuum pump is not running.
a. Check if the bi-metallic switch is connected according to the wiring schematic X78 (depending on model).
b. Activate the pump in Manual mode, to see if the contactor energizes. If not, check the controller output. If it does, check the contactor coil. If similar value as the other, replace the vacuum pump.
4. The vacuum pump is running.
a. Perform “Vacuum system test”.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pump on > 5 min and Pmem > 135 mBar in 15 min, and CO_2act > CO_2set + 2%.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">If the system cannot achieve low pressure, the membrane does not work and is therefore not able to extract CO_2 from the container.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td>Pump on time</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>653</th><th colspan="5">Mpump heat element</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump operating temperature is low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Very low ambient temperature.
• Defective temperature sensor Tpump.
• Defective heating element.
• Defective contactor K10.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the contactor.
3. Check the controller plug for the temperature sensor.
4. Ensure that Tpump is correctly mounted and inserted completely in the sensor pocket.
5. Defective heating element.
a. At the contactor measure the heating element, there should be approx 0.9 kΩ. If not replace the heating element.</td></tr>
<tr><td>Criteria</td><td colspan="6">Heating pump on for 50 minutes; Tpump < Tamb + 5°C.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Condensation of water vapor in the pump housing.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the sensor value becomes valid, it is marked as inactive in the alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td>Heater on time</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>654</th><th colspan="5">Mpump temp high</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Motor for vacuum pump is overheated.</td></tr>
<tr><td>Causes</td><td colspan="6">• Unexpected behaviour in old software version.
• Very high ambient temperature.
• Lack of oil.
• Missing one power phase into the pump.
• Vacuum pump motor is overheated.
• Vacuum pump is defective or jammed.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if the fan for the vacuum pump can turn freely. If it cannot turn, remove any obstacle.
3. Check that the vacuum housing is not blocked.
4. Check that the oil level in the pump is correct.
5. Check that the heating element is turned off, and check the heater contactor.
6. Check that the temperature sensor Tpump is installed correctly.
7. If none of the above solves the problem, and the pump seems to be more than 115°C (239°F), replace the vacuum pump.</td></tr>
<tr><td>Criteria</td><td colspan="6">Tpump > 115°C (239°F).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Stop vacuum pump.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">The CA system will not be able to remove CO2 from the container.</td></tr>
<tr><td>Elimination</td><td colspan="6">AL 654 will become invalid when the temperature decreases.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>656</th><th colspan="5">Mpump service</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump needs oil and filter change.</td></tr>
<tr><td>Cause</td><td colspan="6">• Pump runtime > 2000 h.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Upload the latest software version to the controller.
2. Pump running hours can be viewed in the Service menu, S04 Runtime counters, line R08 Vacuum pump oil/filt.
3. Turn the unit off and disconnect the power to the unit.
4. Dismount the vacuum pump cover by removing the 4 screws.
5. Visually inspect if there are any oil leakages or discolouration of the pump.
6. Use a mirror, mobile phone camera, or remove the pump if needed in order to re-place the filter best possible.
7. Dismount the black exhaust cover or adapter by removing the 4 screws.
8. If installed, loosen the screw (7 mm) that holds the flat spring and filter in place. Turn the flat spring counter clockwise and remove it.
9. Remove the filter. Check that the filter o-ring is not left behind. If so, remove it with a hook.
10. Attach the adaptor to the new filter. Check that the pin of the filter end cap is between 2 fingers and be careful no to get the wire bow between the adapter and the filter.
11. Clean the end of the vacuum pump housing and then insert the new filter with o-ring attached ensuring that it is positioned correctly in the housing with the wire bow at the top.
12. Gently position the adapter end piece and tighten the four screws of the adapter, first with 1 Nm and then with 3 Nm.
13. If no adapter is available, loosen the screw on the flat spring and align the flat spring into its position by turning it clockwise. Tighten the screw (7 mm) to apply adequate force on the spring but do not over tighten, to prevent puncturing the filter end cap.
14. Check the position of the flat spring. It should be perfectly aligned with the housing and should not be able to move when being rotated with your fingers. If it is misaligned, adjust it into the correct position.
15. Clean the end of the vacuum pump housing and mount the black exhaust cover with its 4 screws tightened to 3 Nm.
16. Drain oil from the vacuum pump by removing the lower black plug next to the sight glass. If the sight glass is dirty, remove and clean it ensuring the o-ring is intact and seated correctly before tightening with a 30 mm socket to 15 Nm.
17. Mount the black plug again and via the top black plug, fill up with 350 ml oil (item no. 818668A/818672A). This will exceed the maximum indicator of the sight glass.
18. Reconnect power to the unit and turn it on.
19. Go to the Service menu and select line S01 Manual operation. Change the value of line M01 from Auto to Manual.
20. Go down to line M10 and change the value from Off to On.
21. Let the vacuum pump run for 5 minutes.
22. Go to the Information menu and view line I18 Membrane pressure. The value should be between 20mbar and 79mbar.
23. If not within specified range, proceeed with trouble shooting according to the Operating and Service Manual.
24. Mount the vacuum pump cover and its 4 screws.
25. Active the CA PTI and confirm the change of filter and oil in the alarm 656 message screen. Alternatively, go to the Service menu, S08 Maintenance, select line K01 Mpump oil/filter and confirm the oil and filter change.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pump runtime > 2000 h.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit cannot pass CA PTI. Not performing an oil change every 2000 pump running hours will decrease pump-lifetime dramatically.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the alarm becomes inactive, it can be deleted.</td></tr>
<tr><td rowspan="3">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>0 = Service interval of 2000 h exceeded</td><td>Time since last service</td><td>N/A</td><td>N/A</td><td colspan="2">N/A</td></tr>
<tr><td>1 = Oil level below critical level</td><td>Time spent in oil level detection(s)</td><td>Avg supply voltage (V)</td><td>Energy used (Wh)</td><td colspan="2">Energy threshold (Wh)</td></tr>
</table>

<table>
<tr><th>657</th><th colspan="5">Mpump start failure</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump operating in the wrong direction.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Wrong phase direction.
• Supply voltage to pump defective.
• Pressure tansmitter defective.
• Vacuum hose leak.
• Leaks in the vacuum system.
• Contactor defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Power cycle the controller.
3. Check contactor K10.
4. Check pump connection according to the wiring schematic.
5. See “Vacuum system test”.
6. Check the pressure transmitter Pmem.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pump ON > 7 sec and Pmem > 600 mBar.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Stop Mpump until alarm is either when the unit is power cycled or the phase direction is changed.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Vacuum pump stop and CA non-functionable.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the alarm becomes inactive, it can be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Limit</td><td>Actual</td><td>Pump on time</td><td colspan="2">CO_2</td></tr>
</table>

<table>
<tr><th>658</th><th colspan="5">Mpump start failure</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump cannot start due to bad U/f ratio.</td></tr>
<tr><td>Cause</td><td colspan="6">• Bad power supply to the unit.
• U/f ratio is outside its legal operational envelope and the CA system wants the pump to run.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check unit power supply or try conencting the unit to another correct power source.</td></tr>
<tr><td>Criteria</td><td colspan="6">U/f ratio is outside its legal operational envelope and the CA system wants the pump to run.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">The CA system is not running optimally.</td></tr>
<tr><td>Elimination</td><td colspan="6">The alarm becomes inactive when the U/f ration is inside its legal envelope for more than 1 minute.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>660</th><th colspan="5">Check coil</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Coil(s) acting suspicious.</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more coils needs inspection.
• Controller output electronic defect.
• Coil close circuit.
• Coil open circuit.
• Solenoid coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Measure output voltages (X19) with a multi-meter – OK range 2.5V to 6.5V.
2. Repeat 1. with related coil disconnected to check output.
3. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Valve solenoid coil: approx. 6-7 Ω.
4. Replace components according to 1., 2. and 3.
5. See service bulletin “00053 Controller output voltages” for further.</td></tr>
<tr><td>Criteria</td><td colspan="6">Hardware feedback signal indicating trouble detected.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">If a coil, controlling a valve, is malfunctioning, cooling can be disabled adding risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate alarm.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>
<table>
<tr><td>Coil</td><td>Value</td></tr>
<tr><td>Veco</td><td>512</td></tr>
<tr><td>Vexp</td><td>1024</td></tr>
<tr><td>Vhg</td><td>2048</td></tr>
</table>
If more than one coil fails, values are accumulated e.g Veco and Vhg result in value 512 + 2048 = 2560.
</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><td>661</td><td colspan="5">Check contactor</td><td>Warning</td></tr>
<tr><td>Description</td><td colspan="6">Contactor(s) acting suspicious.</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case of a contactor coil is short circuited (hence the current draw will be too high), the controller voltages output will shut off and the measured output voltage is 0 Vdc.
2. Repeat 1. with related contactor disconnected to check output.
3. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
4. Replace components according to 1., 2. and 3.
5. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Hardware feedback signal indicating trouble detected.</td></tr>
<tr><td>Controller action</td><td colspan="6"></td></tr>
<tr><td></td><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Depending on which contactor potentially is malfunctioning, cooling can be disabled adding risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate alarm.</td></tr>
<tr><td>Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td><table><tr><td>Contactor</td><td>Value</td></tr><tr><td>K2 CCW</td><td>2</td></tr><tr><td>K3 Hevap</td><td>4</td></tr><tr><td>K4 Mcond L</td><td>8</td></tr><tr><td>K5 Mcond H</td><td>16</td></tr><tr><td>K6 Mevap L</td><td>32</td></tr><tr><td>K7 Mevap H</td><td>64</td></tr><tr><td>K8 CW</td><td>128</td></tr><tr><td>K9 Mpump</td><td>16384</td></tr><tr><td>K10 Mheat</td><td>32768</td></tr></table>If more than one contactor fails, values are accumulated e.g K2 CCW and K6 Mevap L result in value 2 + 32 = 34.</td><td>-</td><td>-</td><td>-</td><td colspan="2">-</td></tr>
</table>

<table>
<tr><th>662</th><th colspan="5">Mevap lo contactor</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Mevap low contactor detected to be faulty (only in heating).</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. In Manual mode, verify that the fans are physically running.
2. If alarm is active together with AL 661, check wiring.
3. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case of a contactor coil is short circuited (hence the current draw will be too high), the controller voltages output will shut off and the measured output voltage is 0 Vdc.
4. Repeat point 3 with related contactor disconnected to check output.
5. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
6. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Current consumption is not as expected.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Compensates for MevapLo failure by running with MevapHi.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Increased power consumption and entering fan emergency mode.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate the alarm.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>663</th><th colspan="5">Mevap hi contactor</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Mevap high contactor detected to be faulty (only in heating).</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. In Manual mode, verify that the fans are physically running.
2. If alarm is active together with AL 661, check wiring.
3. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case of a contactor coil is short circuited (hence the current draw will be too high), the controller voltages output will shut off and the measured output voltage is 0 Vdc.
4. Repeat point 3 with related contactor disconnected to check output.
5. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
6. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Current consumption is not as expected.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Compensates for MevapHi failure by running with MevapLo.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Lower ventilation and entering fan emergency mode. Potential risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate the alarm.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>664</th><th colspan="5">Mevap contactors (both)</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Both Mevap contactors detected to be faulty (only in heating).</td></tr>
<tr><td>Cause</td><td colspan="6">• Problem with the interlock.
• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case of a contactor coil is short circuited (hence the current draw will be too high), the controller voltages output will shut off and the measured output voltage is 0 Vdc.
2. Repeat point 1 with related contactor disconnected to check output.
3. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
4. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Current consumption is not as expected.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Release all contactors except K2/K8 and the FC contactor (K1).</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops. Potential risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate the alarm.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>665</th><th colspan="5">Hevap contactor</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Hevap contactors detected to be faulty (only in heating).</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Verify in Manual mode.
2. If alarm is active together with AL 661, check wiring.
3. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case of a contactor coil is short circuited (hence the current draw will be too high), the controller voltages output will shut off and the measured output voltage is 0 Vdc.
4. Repeat point 3 with related contactor disconnected to check output.
5. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range Contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
6. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Current consumption is not as expected.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Reduced capacity. Potential risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle will inactivate the alarm.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>666</th><th colspan="5">Reduced refr. flow</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">The flow of refrigerant in the system is reduced.</td></tr>
<tr><td>Cause</td><td colspan="6">• Expansion valve is incorrectly configured in the controller.
• Solenoid coil connector is defective.
• Solenoid coil is defective.
• Lack of refrigerant in the system.
• Expansion valve is not functioning correctly.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check the expansion valve version is correctly configured. Go to the Service menu, line S05 Configuration, and check the value of line F09 Valve version is Version 1, Version 2 or Version 3. For further valve details, see bulletin 00143.
2. Check the resistance between the solenoid coil and the controller X19 terminal 3-4. It should be 5-6 Ω.
3. If not, remove the connector at the solenoid coil and measure the resistance directly on the solenoid coil.
4. If the resistance is ok, replace the connector for the solenoid coil.
5. If the resistance is not ok, replace the solenoid coil.
6. Measure output voltages on the connector X19 with a multimeter. It should be between 2.5-6.5 V. If not, measure the output voltages directly on the controller terminals. If still not within range, replace the main controller. If within range, replace the connector X19.
7. Check if Tsuc is showing the correct temperature, access cover is installed and sensor is mounted and insulated correctly.
8. Check if Psuc is showing the correct pressure in the bottom left corner of the display by verifying with a zero calibrated manifold.
9. Check for any possible refrigerant flow restriction. E.g. blocked (partly) filter drier, service valves fully open, recent pipe repairs or dents, etc.
10. Check that there is enough refrigerant in the system and that there are no leaks. There should be 4.5 kg in total.
11. Check Vexp with permanent magnet if opens with a firm clicking sound.
12. If alarm is still active, replace the expansion valve. When completed power cycle the unit and run the Vexp test.</td></tr>
<tr><td>Criteria</td><td colspan="6">ITI initiated alarm due to a defective expansion valve.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Reduced cooling capacity. Potential risk to cargo.</td></tr>
<tr><td>Elimination</td><td colspan="6">When the alarm becomes inactive, it can be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Vexp</td><td>Tamb</td><td>Psuc</td><td>Pdis</td><td colspan="2">Result:
0 = Not run
1 = Pressure not acheived
2 = Valve defective
3 = Passed</td></tr>
</table>

670	CA memb/hose leak					Alarm
Description	Vacuum pump has stopped due to leak.					
Cause	• Membrane is leaking. • Vacuum pump hose is leaking.					
Trouble shooting	1. Check the hose connections onto the vacuum pump and the membrane are tight and secured correctly. 2. Start the pump manually by going to the Service menu and selecting line S01 Manual Operation. Change the value of line M01 from Auto to Manual. Go down to line M10 and change the value from Off to On. 3. Disconnect the vacuum hose at the vacuum pump and plug the vacuum pump inlet. 4. If the membrane pressure in the Information menu on line I18 is below 30 mBar, go to point 7. If the pressure is above 30 mBar go to point 9. 5. Connect the hose back onto the vacuum pump and ensure the connection is tight. Disconnect the vacuum hose at the membrane and plug or seal it. If the membrane pressure on line I18 is still below 30 mBar, the membrane connection or the membrane itself is leaking. Replace the membrane. If the unit is in operation with cargo, be aware of possible high CO2 level and low O2 level. Check this on the controller main display. Vent the container according to the Operating and Service Manual before removing the right hand inspection cover. 6. If the membrane pressure on line I18 is above 30 mBar, check the hose for leaks and repair or replace it. Ensure it is connected correctly. After repair or replacement of the vacuum hose, conduct a container leak test according to the Operating and Service Manual. This is not possible on units in operation with cargo. 7. Connect the hose back onto the vacuum pump and ensure the connection is tight. Install a manometer at the transmitter inlet and check the reading is similar to the display reading. If not, replace the pressure transmitter. 8. If the manometer is showing the same "high" pressure (above 30 mBar) as the display, check the vacuum pump running hours in the Service menu, S04 Runtime counters, line R08 Vacuum pump oil/filt. If the number of running hours is above or approaching 2000, perform a mandatory vacuum pump oil and filter change according to the Operating and Service Manual. 9. If the vacuum pump oil and filter has not been changed, check that the vacuum pump oil level is above minimum. Fill with the correct oil type (as specified in the Operating and Service Manual) until maximum level is reached. Check the position of the flat spring. It should be perfectly aligned with the housing and should not be able to move when being rotated with your fingers. If it is misaligned, adjust it into the correct position. If it has fallen off completely, check that there is no damage to the filter before refitting it in the correct position. If the filter has been damaged, replace the filter. 10. Replace the vacuum pump.					
Criteria	Pmem has been greater than 120 mBar and increased from operating pressure to 90% of the ambient pressure in less than 20 sec (rise time).					
Controller action	Mpump stops, CA is deactivated, and AV+ is activated.					
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Reduced O2 control.					
Elimination	Power cycle the unit. CA will automatically be activated again with the previous settings.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Rise time	Pmem amb	Pmem current	Pmem when on		

<table>
<tr><th>671</th><th colspan="5">Mpump vacuum loss</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump has stopped due to loss of vacuum in the system.</td></tr>
<tr><td>Cause</td><td colspan="6">• Vacuum pump oil level is low.
• Vacuum pump filter is damaged or not installed correctly.
• Vacuum pump is defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. If alarm 670 and/or 672 are also active, check troubleshooting for those alarms first.
2. Check the vacuum pump running hours in the Service menu , S04 Runtime counters, line R08 Vacuum pump oil/filt. If the number of running hours is above or approaching 2000, perform a mandatory vacuum pump oil and filter change according to the Operating and Service Manual.
3. If the vacuum pump oil and filter has not been changed, check that the vacuum pump oil level is above minimum. Fill with the correct oil type (as specified in the Operating and Service Manual) until maximum level is reached. Check the position of the flat spring. It should be perfectly aligned with the housing and should not be able to move when being rotated with your fingers. If it is misaligned, adjust it into the correct position. If it has fallen off completely, check that there is no damage to the filter before refitting it in the correct position. If the filter has been damaged, replace the filter.
4. Check the hose connections onto the vacuum pump and the membrane are tight and secured correctly.
5. Start the pump manually by going to the Service menu and selecting line S01 Manual Operation. Change the value of line M01 from Auto to Manual. Go down to line M10 and change the value from Off to On.
6. Disconnect the vacuum hose at the vacuum pump and plug the vacuum pump inlet.
7. If the membrane pressure in the Information menu on line I18 is above 30 mBar, install a manometer at the transmitter inlet and check the reading is similar to the display reading. If not, replace the pressure transmitter.
8. If the manometer is showing the same “high” pressure (above 30 mBar) as the display, replace the vacuum pump.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pmem has been greater than 120 mbar and increased from operating pressure to 90% of the ambient pressure in more than 20 sec (rise time).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Mpump stops, CA is deactivated, and AV+ is activated.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Reduced O2 control.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle the unit. CA will automatically be activated again with the previous settings.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Rise time</td><td>Pmem amb</td><td>Pmem current</td><td>Pmem when on</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>672</th><th colspan="5">Mpump oil low</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump oil level is detected as being low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Vacuum pump oil level is low.
• Vacuum pump filter is damaged or not installed correctly.
• Vacuum pump is defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check the vacuum pump running hours in the Service menu , S04 Runtime counters, line R08 Vacuum pump oil/filt. If the number of running hours is above or approaching 2000, perform a mandatory vacuum pump oil and filter change according to the Operating and Service Manual.
2. If the vacuum pump oil and filter has not been changed, check that the vacuum pump oil level is above minimum. Fill with the correct oil type (as specified in the Operating and Service Manual) until maximum level is reached. Check the position of the flat spring. It should be perfectly aligned with the housing and should not be able to move when being rotated with your fingers. If it is misaligned, adjust it into the correct position. If it has fallen off completely, check that there is no damage to the filter before refitting it in the correct position. If the filter has been damaged, replace the filter.
3. Check the hose connections onto the vacuum pump and the membrane are tight and secured correctly.
4. Start the pump manually by going to the Service menu and selecting line S01 Manual Operation. Change the value of line M01 from Auto to Manual. Go down to line M10 and change the value from Off to On.
5. Disconnect the vacuum hose at the vacuum pump and plug the vacuum pump inlet.
6. If the membrane pressure in the Information menu on line I18 is above 30 mBar, install a manometer at the transmitter inlet and check the reading is similar to the display reading. If not, replace the pressure transmitter.
7. If the manometer is showing the same “high” pressure (above 30 mBar) as the display, replace the vacuum pump.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pmem has been greater than 100 mbar and increased from operating pressure to 90% of the ambient pressure in more than 20 sec (rise time).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Reduced CA efficiency and eventual pump damage.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle the unit.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Rise time</td><td>Pmem amb</td><td>Pmem current</td><td>Pmem when on</td><td colspan="2"></td></tr>
</table>

5.9 Communication alarms (AL 7XX)

<table>
<tr><th>700</th><th colspan="5">No FC/Contr com</th><th>Fatal alarm</th></tr>
<tr><td>Description</td><td colspan="6">FC missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective FC, lack of or improper connection.
• Communication with FC broken.
• Power voltage to the FC not applied (wired for emergency operation?).
• Defective FC.
• X8 cable is defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that cable FC-com is mounted correctly according to wiring diagram inside the controller cabinet and not being damaged.
3. Check that power to the FC is not wired for emergency operation.
4. Verify that there are correct voltages on all 3 phases for the FC.
5. Measure with a multimeter that there is a small DC signal on the connector PCB for cable FC-com.
a. If there is no signal: The main controller is defective. Replace the main controller.
b. If there is signal: The FC is defective and must be replaced. If there is no FC replacement available, the unit can be rewired for emergency operation: See “Emergency Operation” in the Operating and Service Manual.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication with FC not possible.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC reset procedure 0.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Quick flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>FC type</td><td>Communication Quality</td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>710</th><th colspan="5">No userpanel com (Seen in StarView)</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">No communication with display.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective display, lack of or improper connection.
• Communication with display broken.
• Defective display.
• X11 cable is defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that cable COM is mounted correctly (and is not damaged) according to wiring diagram inside the controller cabinet.
3. Verify that there are correct voltages 12 V DC on wire 1.
4. Measure with a multimeter that there is a small DC signal on the wires 2 and 3 connector PCB for cable COM.
a. If there is no signal: The main controller is defective. Replace the main controller.
b. If there is signal: The display is defective and must be replaced. If there is no display permanent replacement available, a substitution display can be used for setting values and evaluate the unit’s status.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication via the display is not possible.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">None. Unit can perform normally without the display.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">User not able to interact with display.</td></tr>
<tr><td>Elimination</td><td colspan="6">When communication to the display is active, it is marked as inactive in alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Which node is unit connected to
1 (bit0) = LUP
2 (bit1) = LPM
4 (bit2) = RH
8 (bit3) = CO2
16 (bit4) = CA (LOM module)
32 (bit5) = O2
64 (bit6) = O2 SST
128 (bit7) = Not used
256 (bit8) = LPM200
512 (bit9) = FC</td></tr>
</table>

<table>
<tr><th>720</th><th colspan="5">No SPM com</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">No communication.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective power module, lack of or improper connection.
• Communication with power module SPM6 broken.
• 12 V DC to the power module SPM6 not applied.
• Defective power module SPM6.
• X11 cable is defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that power module cable is mounted correctly (and is not damaged) according to wiring diagram inside the controller cabinet.
3. Verify that plugs are properly connected.
4. Verify that there are correct voltages on all 3 phases for the power module.
5. Measure with a multimeter that there is a small DC signal on the connector PCB for power module-com.
a. If there is no signal: The main controller is defective. Replace the main controller.
b. If there is signal: The power module is defective and must be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication with controller not possible.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Unit stops.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Which node is unit connected to
1 (bit0) = LUP
2 (bit1) = LPM
4 (bit2) = RH
8 (bit3) = CO2
16 (bit4) = CA (LOM module)
32 (bit5) = O2
64 (bit6) = O2 SST
128 (bit7) = Not used
256 (bit8) = LPM200
512 (bit9) = FC</td></tr>
</table>

730	No RH sens com				Log
Description	RH sensor communication missing.				
Cause	• Unexpected behaviour in old software version. • Indication of defective RH sensor, or lack of or improper connection. • Communication with RH sensor broken. • Defective RH sensor. • X10 cable is defective. • Main controller defective. • CO_2 sensor defective (for some models). • O_2 sensor defective (for some models).				
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Verify that cable RH-com is mounted correctly (and is not damaged) according to wiring diagram inside the controller cabinet. 3. Verify that plugs are properly connected. 4. Verify that there are correct voltages 12 V DC between 1 and 4 on X10 or between 1 and 2 on X73. 5. If model has CO_2 and or O_2 sensor, see troubleshooting for AL 740 and or AL 760 in "Operating and service manual Controlled Atmosphere" 6. Measure with a multimeter that there is a small DC signal between 2 and 3 on X10, and between 2 and 3 on X75. a. If there is no signal: The main controller is defective and must be replaced. b. If there is signal: The RH sensor is defective and must be replaced.				
Criteria	Communication with RH sensor not possible.				
Controller action					
	Log	X	Alarm		Alarm light	Off
Consequence	Dehumidification is impossible and dehumidification will stop.				
Elimination	When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted.				
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5
					Which node is unit connected to 1 (bit0) = LUP 2 (bit1) = LPM 4 (bit2) = RH 8 (bit3) = CO2 16 (bit4) = CA (LOM module) 32 (bit5) = O2 64 (bit6) = O2 SST 128 (bit7) = Not used 256 (bit8) = LPM200 512 (bit9) = FC

<table>
<tr><th>740</th><th colspan="5">No CO_2 sens com</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">CO_2 sensor is missing or communication is lost.</td></tr>
<tr><td>Cause</td><td colspan="6">• Communication to CO_2 sensor lost.
• CO_2 sensor is missing.
• CO_2 sensor is defective.
• COMRH cable and or RH-cable are defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. If one or more alarms are active, check wires, plugs, and connectors.
2. Check voltage supply 12V DC and communication - small AC voltage between 3 and 4 on X10.
3. If only AL 740 active, then check the CO_2 sensor. Possibly test with another CO_2 sensor.
4. If AL 740 is still active, replace the controller module.</td></tr>
<tr><td>Criteria</td><td colspan="6">No communication for 2 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Not possible to run AV+.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted when inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Which node is unit connected to
1 (bit0) = LUP
2 (bit1) = LPM
4 (bit2) = RH
8 (bit3) = CO2
16 (bit4) = CA (LOM module)
32 (bit5) = O2
64 (bit6) = O2 SST
128 (bit7) = Not used
256 (bit8) = LPM200
512 (bit9) = FC</td></tr>
</table>

<table>
<tr><th>750</th><th colspan="5">No SSC com</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">CA module is missing or communication is los.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• CA module is missing.
• Communication to CA module lost.
• CA module defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If one or more alarms are active, check wires, plugs, and connectors.
3. Check voltage supply according to the wiring schematic.
4. If only AL 750 active, then check the connection to the CA module and correct if faulty. If not, then replace the CA module.</td></tr>
<tr><td>Criteria</td><td colspan="6">No communication for 2 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Not possible to run CA.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Which node is unit connected to
1 (bit0) = LUP
2 (bit1) = LPM
4 (bit2) = RH
8 (bit3) = CO2
16 (bit4) = CA (LOM module)
32 (bit5) = O2
64 (bit6) = O2 SST
128 (bit7) = Not used
256 (bit8) = LPM200
512 (bit9) = FC</td></tr>
</table>

<table>
<tr><th>760</th><th colspan="5">No O_2 sens com</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">O_2 sensor is missing or communication lost.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Communication to the O_2 sensor lost.
• Defective O_2 sensor.
• COMRH cable, RH-cable, and/or COMCA cable is defective.
• Controller module defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If one or more alarms are active, check wires, plugs and connectors.
3. Check voltage according to wire diagram.
4. If only AL 760 is active, then check connection to the O_2 sensor and correct if faulty. If not, replace the CA module.</td></tr>
<tr><td>Criteria</td><td colspan="6">No communication for 2 min.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Not possible to run CA.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted when inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Which node is unit connected to
1 (bit0) = LUP
2 (bit1) = LPM
4 (bit2) = RH
8 (bit3) = CO2
16 (bit4) = CA (LOM module)
32 (bit5) = O2
64 (bit6) = O2 SST
128 (bit7) = Not used
256 (bit8) = LPM200
512 (bit9) = FC</td></tr>
</table>

<table>
<tr><th>780</th><th colspan="5">Modem</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Sekstant gateway modem alarm.</td></tr>
<tr><td>Cause</td><td colspan="6">• Gateway generated an alarm due to shock or angle.
• Gateway was connected but connection has been lost.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check modem device for impact damage. Replace modem if damaged.
2. Check wires and plug connections from the controller to the modem.</td></tr>
<tr><td>Criteria</td><td colspan="6">The reefer has been subjected to shocks or operated in a unrecommended orientation. 2 minute timeout with no communication.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">No communication possible.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted when inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>0 = Connection timeout

1 = Shock/Angle</td><td>N/A

0 = Shock

1 = Angle</td><td>N/A

Shock

Amplitude (g)</td><td>N/A

Angle duration (s)</td><td colspan="2">N/A</td></tr>
</table>

5.10 Test alarms (AL 8XX)

<table>
<tr><th>800</th><th colspan="5">Func test failed</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Function test fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• One or more of the individual test steps have failed.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See individual AL 8XX alarms for cause.</td></tr>
<tr><td>Criteria</td><td colspan="6">One or more of the individual test steps have failed.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC will soon trip with error 516 and stop compressor.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Deteriorated control precision and capacity.</td></tr>
<tr><td>Elimination</td><td colspan="6">When currents are normal, it is marked as inactive in alarm list and may then be deleted. Value must be valid for 30 sec. to set alarm inactive.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Failure reason
Bit 1 = Mpump oil needs change</td><td></td><td>Seconds</td><td colspan="2">Alarm count</td></tr>
</table>

<table>
<tr><th>801</th><th colspan="5">Controller</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Power supply for main controller is not sufficient.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See trouble shooting for accompanied alarms. If none appears, then proceed with 3.
3. Clear other active sensor alarms.
4. The power supply or power-cable for main controller defective. Measure voltage for the main controller.
a. Measure voltage for all sensors. Should be between 4.80 V DC and 5.20 V DC for temperature sensors, AirEx sensor and pressure transmitters. Humidity sensor must be between 12.00 V DC and 34.00 V DC. If not OK, the sensor or cable is defective. Replace faulty sensor.
b. Measure outlet on transformer between T3 and T4. Correct range 15.30 V AC – 24.30 V AC. Measure between T5 and T6. Correct range 18.86 V AC – 30.00 V AC. If within range transformer is OK.
c. If voltage is OK, the main controller is defective and main controller must be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">One or more of the internal reference voltages are out of limits.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">FC will soon trip with AL 516 and stop compressor.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>0 = Alarm 953
1 = Alarm 954
2 = Alarm 955
3 = Alarm 956
4 = Alarm 961
5 = Alarm 962
6 = Alarm 963
7 = Alarm 964
8 = Alarm 965
9 = Alarm 966
10 = Alarm 975
11 = Alarm 976
12 = Alarm 969
13 = Alarm 970
14 = Alarm 996</td><td></td><td></td><td colspan="2"></td></tr>
</table>

802	**Air Ex Open**					**Warning**
Description	Manual air exchange is opened preventing other function tests to succeed.					
Cause	• In case the manual airex is opened, during execution of "Temperature and Pressure sensors function test", the Air Ex open alarm (802) is activated.					
Trouble shooting	1. Close the manual airex and re-run "Temperature and Pressure sensors function test" by running FT or PTI again.					
Criteria	Air exchange is opened. Air exchange > 0%.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID					

803	Reduced refr. flow					Warning
Description	The flow of refrigerant in the system is reduced.					
Cause	• Expansion valve is incorrectly configured in the controller. • Solenoid coil connector is defective. • Solenoid coil is defective. • Lack of refrigerant in the system. • Expansion valve is not functioning correctly.					
Trouble shooting	1. Check the expansion valve version is correctly configured. Go to the Service menu, line S05 Configuration, and check the value of line F09 Valve version is Version 1, Version 2 or Version 3. For further valve details, see bulletin 00143. 2. Check the resistance between the solenoid coil and the controller X19 terminal 3-4. It should be 5-6 Ω. 3. If not, remove the connector at the solenoid coil and measure the resistance directly on the solenoid coil. 4. If the resistance is ok, replace the connector for the solenoid coil. 5. If the resistance is not ok, replace the solenoid coil. 6. Measure output voltages on the connector X19 with a multimeter. It should be between 2.5-6.5 V. If not, measure the output voltages directly on the controller terminals. If still not within range, replace the main controller. If within range, replace the connector X19. 7. Check if Tsuc is showing the correct temperature, access cover is installed and sensor is mounted and insulated correctly. 8. Check if Psuc is showing the correct pressure in the bottom left corner of the display by verifying with a zero calibrated manifold. 9. Check for any possible refrigerant flow restriction. E.g. blocked (partly) filter drier, service valves fully open, recent pipe repairs or dents, etc. 10. Check that there is enough refrigerant in the system and that there are no leaks. There should be 4.5 kg in total. 11. Check Vexp with permanent magnet if opens with a firm clicking sound. 12. If alarm is still active, replace the expansion valve. When completed power cycle the unit and run the Vexp test.					
Criteria	FT initiated alarm due to a defective expansion valve.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Reduced cooling capacity. Potential risk to cargo.					
Elimination	When the alarm becomes inactive, it can be deleted.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Tamb	Psuc	Pdis	Result: 0 = Not run 1 = Pressure not acheived 2 = Valve defective 3 = Passed	

<table>
<tr><th>805</th><th colspan="5">Idle current</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Unit idle overcurrent fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• There is a short-circuit in the main controller.
• The power module PCB is defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check cables for sensors for damages.
3. The main controller is defective. Replace the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Idle current exceeds limit of 0.3 A with only controller running.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Idle</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>810</th><th colspan="5">Mevap cur LO speed</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator motor low speed current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Evaporator motor jammed or defective.
• Evaporator motor cables defective.
• Bad connection in plug.
• Evaporator motor cables wired wrong in controller cabinet.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the evaporator motor fans can rotate freely. Turn off power first. Replace motor or make it turn freely again.
3. Check evaporator motor cables for damages.
4. Check that the evaporator motor cables are mounted correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator fan motors have exceeded current limit at low speed. 0.6 – 0.7 Amp on one or more phases.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>INom</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>811</th><th colspan="5">Mevap cur HI speed</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator motor high speed current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Evaporator motor jammed or defective.
• Evaporator motor cables defective.
• Bad connection in plug.
• Evaporator motor cables wired wrong in controller cabinet.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the evaporator motor fans can rotate freely. Turn off power first. Replace motor(s) or make it turn freely again.
3. Check evaporator motor cables for damages.
4. Check that the evaporator motor cables are mounted correct.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator fan motors have exceeded current limit at high speed.
50 Hz: 1.8 – 1.9 Amp.
60 Hz: 2.1 – 2.6 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>INom</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>812</th><th colspan="5">Mevap current OFF</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator motor off current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective evaporator motor contactor.
• Defective contactor driver circuit.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the evaporator motor contactor for defects. Replace the contactor.
3. Check that the evaporator motor cables are mounted correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator fan motors have exceeded off current limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>INom</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

815	Mcond cur LO speed					Warning
Description	Condenser motor low speed current fault.					
Cause	• Unexpected behaviour in old software version. • Condenser motor jammed or defective. • Condenser motor cable defective. • Bad connection in plug • Condenser motor cable wired wrongly in controller cabinet or motor.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Check the condenser motor fan can rotate freely. Turn off power first! Replace motor or make it turn freely again. 3. Check motor cable for damages. 4. Check that the condenser motor cable is mounted correctly.					
Criteria	Condenser fan motor has exceeded current limit at low speed. 0.2 – 0.3 Amp.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	INom	I1	I2	I3	

<table>
<tr><th>816</th><th colspan="5">Mcond cur HI speed</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Condenser motor high speed current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Condenser motor jammed or defective.
• Condenser motor cable defective.
• Condenser motor cable wired wrongly in controller cabinet.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the Condenser motor fan can rotate freely. Turn off power first! Replace motor or make it turn freely again.
3. Check motor cable for damages.
4. Check that the condenser motor cables are mounted correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Condenser fan motor has exceeded current limit at high speed.
50 Hz: 0.7 – 0.8 Amp.
60 Hz: 1.0 – 1.8 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>INom</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

817	Mcond current OFF					Warning
Description	Condenser motor off current fault.					
Cause	• Unexpected behaviour in old software version. • Defective condenser motor contactor. • Defective contactor driver circuit.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Check the condenser motor contactor for defects. Replace the contactor. 3. Check that the condenser motor cable is mounted correctly.					
Criteria	Condenser fan motor has exceeded off current limit.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	INom	I1	I2	I3	

<table>
<tr><th>819</th><th colspan="5">Contactor error</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Contactor(s) acting suspicious.</td></tr>
<tr><td>Cause</td><td colspan="6">• One or more contactors needs inspection.
• Controller output electronic defect.
• Contactor close circuit.
• Contactor open circuit.
• Contactor coil.
• Controller output voltages.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Measure output voltages (X16, X17, X18) with a multi-meter – OK range 2.5V to 6.5V. In case a contactor coil is short circuited (hence the current draw will be too high), the controller’s voltage output will shut off and the measured output voltage will be 0 Vdc.
2. Repeat point 1 with related contactor disconnected to check output.
3. If voltage is out of OK range, measure the resistance of the component connected to the “defective” controller output – OK range for contactor coil: approx. 5-6 Ω (Danfoss), 8-10 Ω (Schneider), 11-13 Ω (ABB).
4. See service bulletin “00053 Controller output voltages” for further information.</td></tr>
<tr><td>Criteria</td><td colspan="6">Only active during ITI.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Fan speed forced to low or high speed. If neither possible alarm 661 becomes active.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">ITI failed and checkmark is cleared.</td></tr>
<tr><td>Elimination</td><td colspan="6">Power cycle the unit to clear the warning.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Contactor error mask:
K3 = 0x0004
K6 = 0x0020
K7 = 0x0040</td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>820</th><th colspan="5">Hevap current ON</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator heater on current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Check contactor.
• Heaters defective.
• Heater power cable defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check voltage in/out of heater contactor, for all 3 phases.
3. Check the power cable for the heaters for defects. Replace cables if they are defective.
4. The heater(s) are defective. Dismount the power for the heaters one by one to find the defective heater, see wiring schematics inside in the controller cabinet. Replace the defective heater.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator heater has exceeded on current limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>821</th><th colspan="5">Hevap current OFF</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator heater off current fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective heater contactor.
• Defective contactor driver circuit.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the heater contactor for defects. Replace the contactor.
3. Check that the heater power cable are mounted correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator heater has exceeded off current limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>822</th><th colspan="5">Hevap current error</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Hevap current failure.</td></tr>
<tr><td>Cause</td><td colspan="6">• Current outside limits in ITI test.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check voltage in/out of heater contactor, for all 3 phases.
3. Check the power cable for the heaters for defects. Replace cables if they are defective.
4. The heater(s) are defective. Dismount the power for the heaters one by one to find the defective heater, see wiring schematics inside in the controller cabinet. Replace the defective heater.</td></tr>
<tr><td>Criteria</td><td colspan="6">Evaporator heater has exceeded on/off current limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>826</th><th colspan="5">Hpump current ON</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Heat vacuum pump too high or too low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective cables.
• Defective heating element.
• Defective controller module.
• Defective power meas.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the connections according to the wiring schematic.
3. Defective heating element, see AL 653.
4. Check supply [Amp] reading and compare with display reading. If reading approx. 10 times normal value, replace the controller module.</td></tr>
<tr><td>Criteria</td><td colspan="6">Current < Imin = 0,5*(U/973,2) or current > Imax = 1,5*(U/973,2).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>827</th><th colspan="5">Hpump current OFF</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Measured current is too high when heater is turned off.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Mheat controller defective.
• Defective controller module.
• Defective contactor.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If no accompanied alarms, check contactor K10.</td></tr>
<tr><td>Criteria</td><td colspan="6">0.5 Amp if off.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>828</th><th colspan="5">Pump oil level</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Low oil in the vacuum pump.</td></tr>
<tr><td>Cause</td><td colspan="6">• Oil level in the vacuum pump is below the limit.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check the vacuum pump sight glass for oil leakage.
2. Check other areas of the vacuum pump for leakage.
3. Check the flat spring or adapter and the filter are correctly positioned and are not damaged. If the filter is damaged, replace the filter.
4. Refill 300 ml oil. If filter has been replaced, fill 350 ml oil.</td></tr>
<tr><td>Criteria</td><td colspan="6">If actual energy is below the energy limit of 15 Wh.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">PTI test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Time spent (sec)</td><td>Avg. supply voltage (V)</td><td>Energy actual (Wh)</td><td colspan="2">Energy limit (Wh)</td></tr>
</table>

830	Mpump current error					Warning
Description	Mpump current failure.					
Cause	• Current outside limits in ITI test. • K9 contactor defective.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. Check the oil level. It shall be at least minimum level. 3. If no accompanied alarms, check contactor K9. If K9 is defective, replace. 4. Run the pump manually and observe current. If the current is outside the range 0.9 - 1.3 A, replace the vacuum pump.					
Criteria	Vacuum pump current is outside its limit 0.9 - 1.3 Amp.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Avg Off Current	Avg On Current			

<table>
<tr><th>831</th><th colspan="5">Pmem sensor</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Pmem above or below 1000 mBar (±60 mBar) after Mpump off for 300 sec.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Measure or hardware error.
• Pmem defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See trouble shooting for accompanied alarms AL 211 and AL 212.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reading out of range. 950 mBar < normal < 1060 mBar.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Airex motor</td><td>Pmem</td><td>CO_2</td><td colspan="2">O_2</td></tr>
</table>

<table>
<tr><th>832</th><th colspan="5">CO_2 sensor</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">No reading or value above 1%.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective cable or sensor.
• Communication to CO2 sensor lost.
• CO2 sensor is missing.
• CO2 sensor is defective.
• COMRH cable and or RH-cable are defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If one or more alarms are active, check wires, plugs, and connectors.
3. Check voltage supply 12V DC and communication - small AC voltage between 3 and 4 on X10.
4. If only AL 740 active, then check the CO2 sensor. Possibly test with another CO2 sensor.
5. If AL 740 is still active, replace the controller module.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reading out of range (normal range 0-1% CO_2).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Airex motor</td><td>Pmem</td><td>CO_2</td><td colspan="2">O_2</td></tr>
</table>

<table>
<tr><th>833</th><th colspan="5">O_2 sensor</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">No reading or value is out of range.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Communication to the O2 sensor lost.
• Defective O2 sensor.
• COMRH cable, RH-cable, and/or COMCA cable is defective.
• Controller module defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If one or more alarms are active, check wires, plugs and connectors.
3. Check voltage according to wire diagram.
4. If only AL 760 is active, then check connection to the O2 sensor and correct if faulty. If not, replace the CA module.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reading out of range (normal 19-22 % O_2).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Airex motor</td><td>Pmem</td><td>CO_2</td><td colspan="2">O_2</td></tr>
</table>

<table>
<tr><th>836</th><th colspan="5">Pmem vacuum</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Unable to create a vacuum.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Leakage or low performance vacuum pump.
• Lack of oil in the vacuum pump.
• Pump not running.
• Leakage involving membrane, hose and/or connections.
• Low performance from the vacuum pump.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if the pump is running. If not, see accompanied alarms for trouble shooting first.
3. The vacuum pump is not running.
a. Check if the bi-metallic switch is connected according to the wire schematic X78 (depending on model).
b. Activate the pump in Manual mode, to see if the contactor energizes. If not, check the controller output.
If it does, check the contactor coil. If similar value as the other, replace the vacuum pump.
4. The vacuum pump is running.
a. Perform “Vacuum system test”.</td></tr>
<tr><td>Criteria</td><td colspan="6">Unable to reach 20 mBar < Pmem < 79 mBar.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after test complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tpump</td><td>Pmem</td><td>CO_2</td><td colspan="2">O_2</td></tr>
</table>

837	Pmem ambient					Warning
Description	Not measuring Pmem pressure 1000 mBar (±60 mBar).					
Cause	• Unexpected behaviour in old software version. • Actual pressure measurement out of range. • Pmem defective.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. See trouble shooting for accompanied alarms.					
Criteria	Unable to reach Pmem. 950 mBar < Pmem < 1060 mBar.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Cannot pass PTI.					
Elimination	Alarm may be deleted after the test is complete.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Tpump	Pmem	CO_2	O_2	

<table>
<tr><th>838</th><th colspan="5">Mpump ON current</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Current failure.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Uses more or less current than specified.
• Bad power connection or supply (1 phase missing).
• Jammed contactor or damaged vacuum pump.
• Low performance from the vacuum pump due to lack of oil.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the oil level. It shall be at least minimum level.
3. Run the pump manually and observe current. If the current is outside the range 0.9 - 1.3 A, replace the vacuum pump.</td></tr>
<tr><td>Criteria</td><td colspan="6">Vacuum pump current is outside its limit 0.9 - 1.3 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>839</th><th colspan="5">Mpump OFF current</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Current in off position is too high.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Mpump contactor K9 defective.
• Defective controller module.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If no accompanied alarms, check contactor K9. If K9 is defective, replace.</td></tr>
<tr><td>Criteria</td><td colspan="6">Less than 0.5 Amp.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Ilimit</td><td>I1</td><td>I2</td><td colspan="2">I3</td></tr>
</table>

<table>
<tr><th>840</th><th colspan="5">Valve leaks</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Valve leak fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• One or more valves have leaks (defective).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check and clear other valve alarms, AL 84X.</td></tr>
<tr><td>Criteria</td><td colspan="6">Temperature indicates cooling.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>T0</td><td>Psuc</td><td>Pdis</td><td colspan="2">Tamb</td></tr>
<tr><td>Info</td><td colspan="6">See “Function test”.</td></tr>
</table>

841	K1 contactor welded					Warning
Description	Contactor damaged (always drawn) making FC always powered.					
Cause	• Contactor contacts welded.					
Trouble shooting	1. Measure the resistance of the K1 contactor resistance. If defect replace contactor.					
Criteria	Turning K1 off is not removing power from FC.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	FC Type	FC online	Mcpr	FC on/off seconds	

<table>
<tr><th>842</th><th colspan="5">Expansion valve</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Expansion valve fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable for expansion valve mounted on wrong valve.
• Cable for expansion valve defective.
• Expansion valve defective.
• Driver circuit for expansion valve defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If there is more than one valve failure, the cables for the valves are presumably switched. Mount cables for valves on the correct valve.
3. Listen if the expansion valve is opening and closing. If not, then go to 4. If the valve is opening and closing, close service valve (pos. 14 P-I diagr.) Run FT again. If the test now is a pass, the expansion valve is defective and should be replaced.
4. Inspect the solenoid coil cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
5. Measure the resistance of the solenoid coil for the expansion valve via terminal 3-4 at X19. It should be above 4.5 Ω. If not dismount the connector plug and check for moisture and corrosion. Replace the connector plug (818761A) if necessary.
6. Manually open the expansion valve in the Manual operation meu. Then measure the controller output voltage via terminal 3-4 at X19. The voltage should be approx. 2.5-6.5 VDC.
7. If there is no voltage, the main controller is defective. Replace the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pdis more than 5 BarE: Max change on Pdis: ±0.75 Bar
Pdis is less than 5 BarE: Max change on Pdis: ±0.30 Bar
Tret more than or equal to -15°C: Min change on T0: +20°K
Tret is less than -15°C: Min change on T0: +10°K</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>T0</td><td>T0 diff.</td><td>Pdis</td><td colspan="2">Pdis diff</td></tr>
</table>

<table>
<tr><th>844</th><th colspan="5">Hot gas valve</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Hot gas valve fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Cable for hot gas valve mounted on wrong valve.
• Cable for hot gas valve defective.
• Hot gas valve defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If there is more than one valve failure, the cables for the valves are presumably switched. Mount cables for valves on the correct valve.
3. Listen if the hot gas valve is opening and closing, if not go to step 5. If the valve is opening and closing disconnect power to the solenoid coil, when the valve is closed and there is hot temperature after the valve (pos. 32 in the P – I diagram), the hot gas valve has a leak and should be replaced. Internal parts of the hot gas valve can be replaced separately.
4. Inspect the solenoid coil cable for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly.
5. Measure the resistance of the solenoid coil for the hot gas valve via terminal 5-6 at X19. It should be above 4.5 Ω. If not dismount the connector plug and check for moisture and corrosion. Replace the connector plug (818761A) if necessary.
6. Manually open the hot gas valve in the Manual operation meu. Then measure the controller output voltage via terminal 5-6 at X19. The voltage should be approx. 2.5-6.5 VDC.
7. If there is no voltage, the main controller is defective. Replace the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pdis more than 5 BarE: Max change on Pdis: ±0.75 Bar
Pdis is less than 5 BarE: Max change on Pdis: ±0.30 Bar
Tret is more than or equal to -15°C: Min. change on T0: +20°K
Tret is less than -15°C: Min. change on T0: +10°K</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>T0</td><td>T0 diff.</td><td>Pdis</td><td colspan="2">Pdis diff.</td></tr>
<tr><td>Info</td><td colspan="6">See “Function test”.</td></tr>
</table>

<table>
<tr><th>846</th><th colspan="5">FC Check</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Internal fault in FC.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Internal failure in the FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check and clear other alarms first.
3. Check that FC cover is mounted correctly with all screws.
4. Check motor cable (Connection cable between FC and compressor).
5. The FC needs repair and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC temperature not increased by 15°C within 5 min. during step 8 of Function test.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tfc</td><td>Tfc diff</td><td>Umotor</td><td colspan="2">Ifc</td></tr>
</table>

<table>
<tr><th>847</th><th colspan="5">High press switch</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">High pressure switch fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Discharge pressure is too high and the high pressure switch off.
• High pressure due to:
- Ambient temperature is over spec. limit +50°C (+122°F).
- Condenser blocked.
- Condenser fan motor is not running or wrong direction.
- Manual valve after compressor closed.
- HP pipe damaged.
• High pressure switch or cable is defective.
• X15 cable is defective.
• K1 contactor defective.
• Wrong pressure transmitter configuration in relation to transmitter type.
• Pressure transmitter defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. The unit uses cooling refrigerant R134a or R513A and it is very difficult to operate at temperatures above specification.
2. If the condenser coil is blocked, clean the condenser coil to secure any residues is removed. It is critical that the condenser is free from fouling and/or dust and there is no limitation for air to go to and from the condenser. If no failures are found and extra cooling is needed, water can be sprayed on the condenser inlet bottom up or if the unit has water cooling installed, then use the water cooler for extra cooling down.
3. Check that the condenser fan is running in the right direction. See the arrows on the unit.
4. If not running, check that there are no alarms for the condenser fan motor, AL 402 and AL 426. Also that the fan can rotate freely.
5. If the pressure rises very quickly after start of the compressor, check that the valve after the compressor (discharge side) is not closed or only partially open. Make sure the valve is fully open.
6. Check that there are no damages to the pipes after the compressor. Repair if they are damaged and check the refrigerant level.
7. Disconnect the cable for the high pressure switch on the main controller according to the wiring schematics inside the control cabinet.
8. Measure the voltage between the two connectors for the high pressure switch on the connector PCB. If the voltage is below 0.5 V DC, measure resistance of compressor/FC contactor coil Schneider (grey type) coil resistance is 6-8 Ω, Schneider (green type) coil resistance is 8-10 Ω, ABB coil resistance is 11-13 Ω, Danfoss coil resistance is 5-6 Ω.
9. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable and high pressure switch.
10. Check if pressure transmitter is according to Service menu, line S05 Configuration, line F08 and set controller according to transmitter type AKS/NSK. Check with gauge that pressure transmitter is giving the right value in display.</td></tr>
<tr><td>Criteria</td><td colspan="6">Pdis is between 20-24 bar.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>T0</td><td>Psuc</td><td>Pdis</td><td colspan="2">Tamb</td></tr>
</table>

848	Temp press invalid				Warning	
Description	Temperature and pressure sensor malfunctioning.					
Cause	• One or more sensors not working. • See corresponding sensor alarm description for alarm 1xx or 2xx					
Trouble shooting	1. See corresponding sensor alarm description for alarm 1xx or 2xx					
Criteria						
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination						
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Invalid temperature sensors (bit field) Tret = 0x0001 Tsup1 = 0x0002 Tsup2 = 0x0004 Tevap = 0x0080 Tsuc = 0x0100 Tamb = 0x0200 Tpump = 0x400		Invalid pressure sensors (bit field) Pdis(TC) = 0x0001 Psuc(T0) = 0x0002 Pmem = 0x0004		

849	Valve error					Warning
Description	Check that compressor can operate valves failed.					
Cause	• Unexpected behaviour in old software version. • Compressor nonoperational or expansion/hot gas valves not able to open/ close correctly. • Cable for expansion/hot gas valve mounted on wrong valve. • Cable for expansion/hot gas valve defective. • Expansion valve/hot gas defective.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. If there is more than one valve failure, the cables for the valves are presumably switched. Mount cables for valves on the correct valve. 3. Inspect the solenoid coil cables for damages and poor splices. If there is a poorly done splice, cut out the damaged part and splice the cable properly. 4. Measure the resistance of the solenoid coils for each valve via terminal 1-2, 3-4, and 5-6 at X19. Each should be above 4.5 Ω. If not dismount the connector plugs and check for moisture and corrosion. Replace the connector plugs (818761A) if necessary. 5. Listen if the expansion valve is opening and closing. If not, then go to 6. If the valve is opening and closing, close service valve (pos. 14 P-I diagr.). Run FT again. If the test now is a pass, the expansion valve is defective and should be replaced. 6. Listen if the hot gas valve is opening and closing, if not go to step 7. If the valve is opening and closing disconnect power to the solenoid coil, when the valve is closed and there is hot temperature after the valve (pos. 32 in the P – I diagram), the hot gas valve has a leak and should be replaced. Internal parts of the hot gas valve can be replaced separately. 7. Manually open the each valve individually in the Manual operation meu. Then measure the controller output voltage via terminal 1-2 (Veco), 3-4 (Vexp), and 5-6 (Vhg) at X19. The voltage of each should be approx. 2.5-6.5 VDC. 8. If there is no voltage, the main controller is defective. Replace the main controller.					
Criteria	Pdis more than 5 BarE: Max change on Pdis: ±0.75 Bar Pdis is less than 5 BarE: Max change on Pdis: ±0.30 Bar Tret is more than or equal to -15°C: Min. change on T0: +20°K Tret is less than -15°C: Min. change on T0: +10°K					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination						
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Passed on reliability	Mass flow compressor	Mass flow expansion valve	T0 mean	

850	PTI test failed					Warning
Description	PTI Test Fault.					
Cause	• Unexpected behaviour in old software version. • There is one or more alarms.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. There are other AL 8XX alarms. Check and clear the other alarms first. Then a new PTI test can be run.					
Criteria	One or more of the individual PTI test steps have failed.					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID			Seconds	Alarm count	

<table>
<tr><th>851</th><th colspan="5">Alarm is active</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Active alarms turning ITI checkmark off.</td></tr>
<tr><td>Cause</td><td colspan="6">• This warning is set, when ITI monitor has identified one or more active alarms. Warning is only logged when ITI result logging is requested.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. This warning is only reflecting other alarms, so look at these individual descriptions.</td></tr>
<tr><td>Criteria</td><td colspan="6">One or more active alarms.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>First active alarm code</td><td>Second active alarm code</td><td>Third…</td><td colspan="2">Fourth…</td></tr>
</table>

<table>
<tr><th>852</th><th colspan="5">FC self test</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">FC self test not passed.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Other FC warnings or alarms are active.
• Internal error in FC.
• Defective FC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check the active and inactive alarm(s)/warning(s) and trouble shoot accordingly. Always start at the bottom of the list as that was the first alarm/warning.
3. Go to the Service menu, line S05 Configuration, and check that line F03 FC type is set to FC 2.0
4. Check that the FC is not wired for emergency operation.
5. Replace the defective FC.</td></tr>
<tr><td>Criteria</td><td colspan="6">FC self test has found a failure in the FC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">PTI test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>DenyReason:
0=N/A
1=Wrong FC
2=FC offline
3=Temp high
4=Cpr running
5=Trip lock
6=Motor heat
7=IT grid
8=FC internal
9=Test timeout</td><td>Fault code high 16 bit</td><td>Fault code low 16 bit</td><td colspan="2">Tfc</td></tr>
</table>

<table>
<tr><th>855</th><th colspan="5">PTI Tset 5</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">PTI 5°C set fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of insufficient performance.
• Doors are open.
• The heaters do not operate correctly.
• There may not be enough refrigerant in the unit.
• The cooling capacity is too limited.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that the doors are closed.
3. If start temperature was below +5°C, the heaters may be defective. Start the heaters in manual mode and see if the current consumption is higher than 5 A each phase.
4. The unit may be lacking refrigerant. Check if the small red balls in the sight glass in the receiver (receiver tank) are not at the bottom when the unit is turned off. Search for leaks, repair and charge the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Set-point +5°C was not reached within the 3 hour limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tset</td><td>Tact</td><td>Tevap</td><td colspan="2">Tret</td></tr>
</table>

<table>
<tr><th>860</th><th colspan="5">PTI Tset 0</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">PTI 0°C set fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Doors are open.
• The heaters do not operate normally.
• There may not be enough refrigerant in the unit.
• The cooling capacity is too limited.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that the doors are closed.
3. If start temperature was below 0°C, the heaters may be defective. Start the heaters in manual mode and see if the current consumption is higher than 5 A each phase.
4. The unit may need refrigerant. Check if the small red balls in the sight glass in the receiver (receiver tank) are not at the bottom when the unit is turned off. Search for leaks, repair and charge the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Set-point 0°C was not reached within the 3 hour time limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tset</td><td>Tact</td><td>Tevap</td><td colspan="2">Tret</td></tr>
</table>

<table>
<tr><th>861</th><th colspan="5">Broken valve plates</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Compressor mass flow indicates valve plate has become defect.</td></tr>
<tr><td>Cause</td><td colspan="6">• Broken valve plates.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Exchange valve plate.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor mass flow difference constant.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>862</th><th colspan="5">LowRefrig/ExvBlock</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Compressor mass flow too low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Severe lack of refrigerant or blocked expansion valve.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Ensure unit has been running 10 to 20 minutes.
2. Check refrigerant level. If low, find leak point, repair and recharge unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor mass flow too low.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>863</th><th colspan="5">Expansion valve leak</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Valve fault</td></tr>
<tr><td>Cause</td><td colspan="6">• Expansion valve leaks.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If there is more than one valve failure, the cables for the valves are presumably switched. Mount cables for valves on the correct valve.
3. Listen if the expansion valve is opening and closing. If not, then go to 4. If the valve is opening and closing, close service valve (pos. 14 P-I diagr.). Run FT again. If the test now is a pass, the expansion valve is defective and should be replaced.
4. Check that the cable for the expansion valve is not defective. Replace cable if it is damaged.
5. Disconnect the cable for valve and measure that there is voltage on the output for the expansion valve when it should open. If there is no voltage, the main controller is defective. Replace the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Compressor mass flow difference decreased.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>870</th><th colspan="5">PTI defrost</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">PTI defrost fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective Tevap temperature sensor.
• Defective Psuc pressure transmitter.
• Defective heaters.
• Defective hot gas valve.
• Evaporator was filled with too much ice.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Defrosting is terminated when Tevap rises above +15°C (+59°F). Check Tevap and Psuc sensors according to trouble shooting in alarms AL 123 and AL 207.
3. The heaters may be defective. Start the heaters in manual mode and see if the current consumption is higher than 5 A per phase else the heaters or the power cables for the heaters may be defective.
4. The hot gas valve is not working properly and the heaters may be defective. Check trouble shooting for the hot gas valve in alarm AL 844.
5. See if the evaporator is filled with ice (through the inspection holes). Be careful with the evaporators fans.</td></tr>
<tr><td>Criteria</td><td colspan="6">Defrost terminated on 45 min. time-out.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tset</td><td>Tact</td><td>Tevap</td><td colspan="2">Tret</td></tr>
</table>

<table>
<tr><th>880</th><th colspan="5">PTI Tset -18</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">PTI –18°C set fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of insufficient performance.
• Doors are open.
• There may not be enough refrigerant in the unit.
• The cooling capacity is too limited.
• Hot gas valve leaking.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that the doors are closed.
3. The unit may need refrigerant. Check if the small red balls in the sight glass in the receiver (receiver tank) are not at the bottom when the unit is turned off. Refill with refrigerant.
4. Hot gas valve is leaking. Feel both sides (before and after) the valve - there should be a temp. diff. in this case.</td></tr>
<tr><td>Criteria</td><td colspan="6">Setpoint -18°C was not reached within the 3 hour time limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tset</td><td>Tact</td><td>Tevap</td><td colspan="2">Tret</td></tr>
</table>

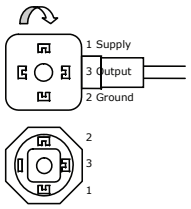
<table>
<tr><th>884</th><th colspan="5">Psuc invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Compressor suction pressure transmitter invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective compressor suction pressure transmitter or its measuring circuitry.
• Connector for suction pressure transmitter Psuc not correctly mounted.
• Suction pressure transmitter Psuc defective.
• Cable for suction pressure transmitter Psuc defective.
• Check Schrader valve.
• X22 and cable is defective.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Compare pressure in display with service gauge. Disconnect the cable for Psuc on the main controller according to the wiring schematics inside the control cabinet and from the suction pressure transmitter.
2. Try to correct the error by uploading the latest software version to the controller.
3. Check that the connector is mounted correctly according to the drawing for pressure transmitter AKS or NSK respectively. The earth stud must be on the opposite side of the cable (AKS):
 

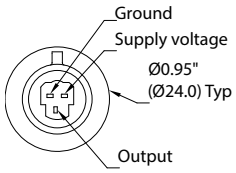
Figure for AKS
 

Figure for NSK
4. Check the cable (measure the resistance in the cable). If the cable is defective, replace cable.
5. Mount the cable for Psuc in controller cabinet and on the transmitter. Disconnect signal wire on main controller. Measure voltage between wire and GND on main controller.
AKS: If voltage is below 0.5 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.5 V DC and 4.5 V DC, continue to 6.
NSK: If voltage is below 0.37 V DC, transmitter or connection between transmitter and cable is defective. If voltage is between 0.37 V DC and 4.0 V DC, continue to 6.
6. Mount signal wire. Measure voltage between SIGNAL and GND.
AKS: If voltage is between 0.5 V DC and 4.5 V DC and this alarm is still active, replace main controller.
NSK: If the voltage is between 0.37 V DC and 4.0 V DC and this alarm is still active, replace main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -0.9 BarE (-13 Psi) or above 11.8 BarE (171 Psi). Value invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>885</th><th colspan="5">Tsup1 invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Supply air temperature sensor 1 invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective supply air temperature sensor, its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 103 or AL 104 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).
• Difference between Tsup1 and Tsup2 is larger than 1°C:
1°C difference for more than 30 min. up to 10°C difference in more than 3 min.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If alarms AL 103 or AL 104 are active, check their trouble shooting first.
3. Check that both sensors, Tsup1 and Tsup2 are mounted correct in the supply air pockets.
4. Disconnect the sensor cable for sensor Tsup1 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value is below alarm limit -50°C (-58°F) or above +100°C (+212°F) or difference between Tsup1 and Tsup2 is more than 1°C (1,8°F) for 30 min. Value invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>886</th><th colspan="5">Tsup2 invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Supply air temperature sensor 2 invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective supply air temperature sensor or its measuring circuitry or sensor not mounted correctly in unit.
• Active alarms AL 106 or AL 107 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).
• Difference between Tsup1 and Tsup2 is larger than 1°C:
1°C difference for more than 30 min. or up to 10°C difference in more than 3 min.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If alarms AL 106 or AL 107 are active, check their trouble shooting first.
3. Check that both sensors, Tsup1 and Tsup2 are mounted correct in the supply air pockets.
4. Disconnect the sensor cable for sensor Tsup2 from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
5. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value is below alarm limit -50°C (-58°F) or above +100°C (+212°F) or difference between Tsup1 and Tsup2 is more than 1°C for 30 min. or up to 10°C difference. Value invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>887</th><th colspan="5">Tevap invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Evaporator temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective evaporator temperature sensor or its measuring circuitry.
• Active alarms AL 121 or AL 122 (if CIM 5 software)
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If alarms AL 121 or AL 122 are active, check their trouble shooting first.
3. Disconnect the sensor cable for sensor Tevap from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
4. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -50°C (-58°F) or above +100°C (+212°F). Value must be invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>888</th><th colspan="5">Tsuc invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Suction temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective suction temperature sensor or its measuring circuitry.
• Active alarms AL 124 or AL 125 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If alarms AL 124 or AL 125 are active, check their trouble shooting first.
3. Disconnect the sensor cable for sensor Tsuc from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
4. Measure the resistance between the two wires. If the resistance is out of range, see “Temperature sensor - resistance table”, the temperature sensor and cable are defective and should be replaced.
5. Ensure that the foam gasket on the backside of the air exchange damper is not damaged and that the damper is fully closed as this can influence the temperature readings during the test.</td></tr>
<tr><td>Criteria</td><td colspan="6">Value below alarm limit -50°C (-58°F) or above +100°C (+212°F). Value must be invalid for 30 sec. for alarm activation.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>889</th><th colspan="5">Tret invalid</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Return air temperature sensor invalid.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective return air temperature sensor or its measuring circuitry.
• Active alarms AL 100 or AL 101 (if CIM 5 software).
• Temperature sensor reading is out of valid range:
-50°C (-58°F) or above +100°C (+212°F).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If alarms AL 100 or AL 101 are active, check their trouble shooting first.
3. Disconnect the sensor cable for sensor Tret from the connector on the main controller, according to the wiring schematics inside in the control cabinet.
4. Measure the resistance between the two wires.
a. If the resistance is out of range, see “Temperature sensor - resistance table”. The temperature sensor and cable are defective and should be replaced.
b. If the resistance is within range, perform main controller check “Trouble shooting for Star Cool main controller” before replacing main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Sensor is defective and the missing sensor reading has been substituted by a value from AAS system. See “Alarm Action System (AAS)”.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Max deviation</td><td>Actual deviation</td><td>Failing sensor actual value</td><td colspan="2">Average value of OK sensors</td></tr>
</table>

<table>
<tr><th>890</th><th colspan="5">PTI Tset 13</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">PTI 13°C (55°F) Set Fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Doors are open.
• There may not be enough refrigerant in the unit.
• The heaters do not operate correctly.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that the doors are closed.
3. If start temperature was below +5°C (41°F), the heaters may be defective. Start the heaters in Manual mode and see if the current consumption is higher than 5 A each phase.
4. The unit may be lacking refrigerant. Check if the small red balls in the sight glass in the receiver (receiver tank) are not at the bottom when the unit is turned off . Search for leaks, then repair and charge the unit.</td></tr>
<tr><td>Criteria</td><td colspan="6">Setpoint +13°C (55.4°F) was not reached within the 3 hour limit.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may then be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tset</td><td>Tact</td><td>Tevap</td><td colspan="2">Tret</td></tr>
</table>

<table>
<tr><th>894</th><th colspan="5">RH sensor</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">RH sensor communication missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Indication of defective RH sensor, or lack of or improper connection.
• Communication with RH sensor broken.
• Defective RH sensor.
• X10 cable is defective.
• Main controller defective.
• CO2 sensor defective (for some models).
• O2 sensor defective (for some models).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Verify that cable RH-com is mounted correctly (and is not damaged) according to wiring diagram inside the controller cabinet.
3. Verify that plugs are properly connected.
4. Verify that there are correct voltages 12 V DC between 1 and 4 on X10 or between 1 and 2 on X73.
5. If model has CO2 and or O2 sensor, see troubleshooting for AL 740 and or AL 760 in “Operating and service manual Controlled Atmosphere”
6. Measure with a multimeter that there is a small DC signal between 2 and 3 on X10, and between 2 and 3 on X75. If there is no signal: The main controller is defective and must be replaced. If there is signal: The RH sensor is defective and must be replaced.</td></tr>
<tr><td>Criteria</td><td colspan="6">Communication with RH sensor not possible.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Humidity control not possible.</td></tr>
<tr><td>Elimination</td><td colspan="6">When sensor value becomes valid, it is marked as inactive in alarm list and may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

895	**CO_2 sensor**					**Warning**
Description	The CO_2 sensor communication and CO_2 level are tested.					
Cause	• Communication failed and/or CO_2 level out of normal range.					
Trouble shooting	1. If one or more alarms are active, check wires, plugs, and connectors. 2. Check voltage supply 12V DC and communication - small AC voltage between 3 and 4 on X10. 3. If only AL 740 active, then check the CO2 sensor. Possibly test with another CO2 sensor. 4. If AL 740 is still active, replace the controller module					
Criteria	No communication for 2 min. Reading out of range (normal range 0-1% CO2).					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Not possible to run AV+. Cannot pass PTI.					
Elimination	Alarm may be deleted when inactive and after the test is completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID					

896	**O_2 sensor**					**Warning**
Description	The O_2 sensor communication and O_2 level are tested.					
Cause	• Communication failed and/or O_2 level out of normal range.					
Trouble shooting	1. Try to correct the error by uploading the latest software version to the controller. 2. If one or more alarms are active, check wires, plugs and connectors. 3. Check voltage according to wire diagram. 4. If only AL 760 is active, then check connection to the O2 sensor and correct if faulty. If not, replace the CA module.					
Criteria	No communication for 2 min. Reading out of range (normal 19-22 % O2).					
Controller action						
	Log	X	Alarm	X	Alarm light	Off
Consequence	Not possible to run CA. Cannot pass PTI.					
Elimination	Alarm may be deleted when inactive or when test is completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID	Insession	O_2 level			

<table>
<tr><th>897</th><th colspan="5">Hpump broken</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Vacuum pump could not be heated.</td></tr>
<tr><td>Cause</td><td colspan="6">• Vacuum pump heater is turned on, but vacuum pump temperature does not exceed 75°C (167°F) before timeout.
• Lack of oil in the vacuum pump.
• Defective temperature sensor (Tpump) in the vacuum pump.
• Heater contactor K10 is defective.
• Defective heating element.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Check the oil level in the vacuum pump must be in the required level.
2. Measure the voltages to and from the K10 contactor when it is energized and the resistance in the contactor coil (A1-A2) and compare the value with the other contactors.
3. Check that the temperature sensor is fully inserted into the sensor pocket and that it is free from damages and is properly connected at the controller X27 according to the wiring diagram.
4. Measure the resistance at the contactor K10. There should be approx. 0.9 kΩ. If not replace the heating element.</td></tr>
<tr><td>Criteria</td><td colspan="6">Vacuum pump temperature > 75°C (167°F) within 75 minutes of heating.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Test failed.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after test completed.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td>Step ID</td><td>Tpump (start)</td><td>Tpump (end)</td><td></td><td colspan="2"></td></tr>
</table>

899	**ITI failed**					**Log**
Description	ITI test fault.					
Cause	• Normal function will be affected as there is one or more ITI alarms.					
Trouble shooting	1. Check ITI alarms generated and correct accordingly.					
Criteria	One or more of the individual ITI test steps have failed.					
Controller action						
	Log	X	Alarm		Alarm light	Off
Consequence	Test failed.					
Elimination	Alarm may then be deleted after test completed.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Step ID					

5.11 Controller alarms (AL 9XX)

902	Main battery malfunction					Alarm
Description	Main battery malfunctioning.					
Cause	• The main battery used for logging is defective.					
Trouble shooting	1. Check if alarm 999 is active and if so troubleshoot accordingly. 2. Verify that the battery is an original Star Cool rechargeable battery. 3. Run the unit for a minimum of 3 hours in order to charge the main battery. 4. If the voltage is not in the range of 10-18 V, replace the main battery.					
Criteria	CIM 6.0 controller: Main battery voltage is below lower limit (10 V) or above upper limit (18 V). CIM 6.1 and 6.2 controller: If the voltage rise of the main battery is more than 0.7 V in 2 minutes while charging.					
Controller action						
	Log	X	Alarm	X	Alarm light	Slow flash
Consequence	Logging in the battery mode not possible. When detected during PTI test, the test will fail.					
Elimination	Alarm will be marked as inactive in alarm list when voltage reoccurs on battery. Alarm may then be deleted.					
Log data	Parm 1	Parm 2	Parm 3	Parm 4	Parm 5	
	Reason: 0 = Low voltage 1 = High voltage 2 = Voltage change	Internal battery state	Battery voltage	Battery voltage change		

<table>
<tr><th>904</th><th colspan="5">Datalog error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">SCCU6 data log fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Datalog in controller has become defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. The unit will continue its temperature control, but the logging of data is unreliable.
2. Try to correct the error by uploading the latest software version to the controller.
3. Replace main controller.
4. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Controller data log corrupted.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Data logging unreliable. Temperature control is functioning.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>1 or 2</td><td></td><td></td><td colspan="2">Error bits</td></tr>
</table>

<table>
<tr><th>905</th><th colspan="5">Database corrupt</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">SCCU6 database faulty.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Failed validation of EEPROM backup.
• Main controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Replace main controller.
3. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Controller database corrupted.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Default value preset.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Parameters may have changed.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>907</th><th colspan="5">Real-time error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Real-time clock unreliable.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Main battery or real-time clock battery defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Reset the GMT in the Service menu (S03).
3. Check if alarm 999 is active and if so troubleshoot accordingly.
4. Verify that the battery is an original Star Cool rechargeable battery.
5. Turn on the unit and let it run for minimum 3 hours.
6. Check the main battery voltage. If it is not in the range of 10V-18V, replace the main battery.
7. If the alarm still active after replacing the main controller.</td></tr>
<tr><td>Criteria</td><td colspan="6">Activated in case of real-time clock read/write fault.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Invalid date/time setting in datalog.</td></tr>
<tr><td>Elimination</td><td colspan="6">Check real-time clock battery and main battery. Reset the GMT. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>953</th><th colspan="5">Temp ref 1 LO</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective sensor pulling power supply down.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has a short circuit or other damages. If OK, the main controller is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage 1 below 3.16 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Temperature measurement too high.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
<tr><td>Info</td><td colspan="6">The measured voltage is internal on the main controller and cannot easily be measured.</td></tr>
</table>

<table>
<tr><th>954</th><th colspan="5">Temp ref 1 HI</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has an open circuit or other damages. If voltages are OK, the main controller is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage 1 above 3.29 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Temperature measurement too low.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
<tr><td>Info</td><td colspan="6">The measured voltage is internal on the main controller and cannot easily be measured.</td></tr>
</table>

<table>
<tr><th>955</th><th colspan="5">Temp ref 2 LO</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective sensor pulling power supply down.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has a short circuit or other damages. If OK, the main controller is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage 1 below 3.16 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Temperature measurement too high.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
<tr><td>Info</td><td colspan="6">The measured voltage is internal on the main controller and cannot easily be measured.</td></tr>
</table>

<table>
<tr><th>956</th><th colspan="5">Temp ref 2 HI</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has an open circuit or other damages. If voltages are OK, the main controller is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage 1 above 3.29 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Temperature measurement too low.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
<tr><td>Info</td><td colspan="6">The measured voltage is internal on the main controller and cannot easily be measured.</td></tr>
</table>

<table>
<tr><th>961</th><th colspan="5">Pdis sens sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective Pdis pressure transmitter.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the ”special menu” by pressing  for more than 3 sec. Scroll down until you see the label ”U Pdis” in the display. The value of ”U Pdis” should be in the range between 4.50 V and 5.5 V DC.
4. While displaying “U Pdis”, remove the connector at Pdis.
– If “U Pdis” is now inside the above range, the Pdis pressure transmitter is defective. Replace the Pdis pressure transmitter.
– If “U Pdis” is still outside the above range, proceed to next step.
5. While displaying “U Pdis”, disconnect Pdis from the terminals according to wiring schematics inside in the control cabinet.
– If “U Pdis” is now inside the above range, the cable for Pdis is defective. Replace cable for Pdis.
– If the correct voltage is measured at X22 then circuit is defective.
6. Replace the main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage Pdis below 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>962</th><th colspan="5">Pdis sens sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the ”special menu” by pressing for more than 3 sec. Scroll down until you see the label ”U Pdis” in the display. The value of ”U Pdis” should be in the range between 4.50 V and 5.5 V DC.
4. While displaying “U Pdis”, remove the connector at Pdis.
– If “U Pdis” is now inside the above range, the Pdis pressure transmitter is defective. Replace the Pdis pressure transmitter.
– If “U Pdis” is still outside the above range, proceed to next step.
5. While displaying “U Pdis”, disconnect Pdis from the terminals according to wiring schematics inside in the control cabinet.
– If “U Pdis” is now inside the above range, the cable for Pdis is defective. Replace cable for Pdis.
– If the correct voltage is measured at X22 then circuit is defective.
6. Replace the main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage Pdis above 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>963</th><th colspan="5">Psuc sens sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective Psuc pressure transmitter.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the “special menu” by pressing for more than 3 sec. Scroll down until you see the label “U Psuc” in the display. The value of “U Psuc“ should be in the range between 4.50 V and 5.5 V DC.
4. While displaying “U Psuc“, remove the connector at Psuc.
– If “U Psuc” is now inside the correct above range (4.50 V – 5.5 V DC), the Psuc pressure transmitter is defective. Replace the Psuc pressure transmitter.
– If “U Psuc” is still outside the above range, proceed to next step.
5. While displaying “U Psuc“, disconnect Pdis from the terminals according to wiring schematics inside in the control cabinet.
– If “U Psuc” is now inside the above range the cable for Psuc is defective. Mount connector correctly or replace connector cable for Psuc.
– If the correct voltage is measured at X22 then circuit is defective.
6. Replace the main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage Psuc below 4.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>964</th><th colspan="5">Psuc sens sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the “special menu” by pressing for more than 3 sec. Scroll down until you see the label “U Psuc” in the display. The value of “U Psuc“ should be in the range between 4.50 V and 5.5 V DC.
4. While displaying “U Psuc“, remove the connector at Psuc.
– If “U Psuc” is now inside the correct above range (4.50 V – 5.5 V DC), the Psuc pressure transmitter is defective. Replace the Psuc pressure transmitter.
– If “U Psuc” is still outside the above range, proceed to next step.
5. While displaying “U Psuc“, disconnect Pdis from the terminals according to wiring schematics inside in the control cabinet.
– If “U Psuc” is now inside the above range the cable for Psuc is defective. Mount connector correctly or replace connector cable for Psuc.
– If the correct voltage is measured at X22 then circuit is defective.
6. Replace the main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage Psuc above 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>965</th><th colspan="5">Controller sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. The main controller is defective.
4. Replace the main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage below 4.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement from sensors X22 and X23.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>966</th><th colspan="5">Controller sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has an open circuit or other damages. If voltages are OK, the main controller is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage above 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement from sensors X22 and X23.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
<tr><td>Info</td><td colspan="6">The measured voltage is internal on the main controller and cannot easily be measured.</td></tr>
</table>

<table>
<tr><th>967</th><th colspan="5">AirExMot sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective sensor pulling power supply down.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the “special menu” by pressing  for more than 3 sec. Scroll down until you see the label “U Motor pos” in the display. The value of “U Motor pos“ should be in the range between 4.50 and 5.5 V DC.
4. While displaying “U Motor pos“, remove the connector at AirEx potentiometer.
– If “U Motor pos“ is now inside the correct above range (4.50 – 5.50 V DC), the motor potentiometer is defective. Replace the “AirMotor”.
– If “U Motor pos” is still outside the above range, proceed to next step.
5. While displaying “U Motor pos“, disconnect “AirMotor” from the terminals according to wiring schematics inside in the control cabinet.
– If “U AirEx” is now inside the above range the cable for “AirMotor” is defective. Mount connector correctly or replace connector cable for “AirMotor”.
– If the correct voltage is measured at X23 then circuit is defective.
6. Replace the main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage air exchange motor below 4.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>968</th><th colspan="5">AirExMot sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has an open circuit or other damages. If the correct voltage is measured at X23 then circuit is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage air exchange motor above 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>969</th><th colspan="5">AirEx sens sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective sensor pulling power supply down.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the “special menu” by pressing  for more than 3 sec. Scroll down until you see the label “U AirEx” in the display. The value of “U AirEx“ should be in the range between 4.50 V DC and 5.5 V DC.
4. While displaying “U AirEx“, remove the connector at AirEx potentiometer.
– If “U AirEx“ is now inside the correct above range (4.50 – 5.50 V DC), the AirEx potentiometer is defective. Replace the AirEx potentiometer
– If “U AirEx” is still outside the above range, proceed to next step.
5. While displaying “U AirEx“, disconnect “AirEx” from the terminals according to wiring schematics inside in the control cabinet.
– If “U AirEx” is now inside the above range the cable for “AirEx” is defective. Mount connector correctly or replace connector cable for “AirEx”.
– If the correct voltage is measured at X22 and at X23 then circuit is defective.
6. Replace main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage air exchange below 4.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>970</th><th colspan="5">AirEx sens sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 5 V signals to see if power supply has an open circuit or other damages. If the correct voltage is measured at X22 and at X23 then circuit is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage air exchange above 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>971</th><th colspan="5">Sensor bus sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Supply voltage sensor bus low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective 12 V power supply on main controller.
• Defective main controller.
• Short circuit on sensor.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Access the “special menu” by pressing for more than 3 sec. Scroll down until you see the label “U sensor bus” in the display. The value of “U sensor bus“ should be in the range between 11 and 14 V DC.
4. While displaying “U sensor bus“, remove the connector on the RH cable at the first bus sensor (RH and or CO_2 sensor).
– If “U sensor bus” is now inside the correct above range (10 – 14 V DC), the RH and or CO_2 sensor is defective. Replace the sensor(s) connected to sensor bus cable.
– If “U sensor bus” is still outside the above range, proceed to next step.
5. While displaying “U sensor bus“, disconnect sensor from the terminals according to wiring schematics inside in the control cabinet.
– If “U sensor bus” is now inside the above range the cable for the RH and or CO_2 sensor(s) is defective. Mount connector correctly or replace connector cable for RH and or CO_2 sensor(s).
– If the correct voltage is measured at X10 then circuit is defective.
6. Replace main controller.
7. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage U sensor bus below 10 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>972</th><th colspan="5">Sensor bus sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective 12 V power supply on main controller.
• Defective main controller.
• Short circuit between 24 V DC and 12 V DC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 12 V signals to see if power supply has an short circuit or other damages. If the correct voltage is measured at X10 then circuit is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage sensor bus above 14 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement and damage to sensors.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>973</th><th colspan="5">SUP6 SPM6 sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Supply voltage SUP6 SPM6 low.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective 12 V power supply to SUP6 or SMP6.
• Short circuit on SUP6 SPM6.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms (AL 971 and or AL 972) Clear these alarms first using their trouble shooting.
3. Disconnect the air exchange X23 and RH sensor X10 from the controller. If one of these is defective it can interrupt the controller voltages.
4. Access the “special menu” by pressing for more than 3 sec. Scroll down until you see the label “SUP6 SPM6” in the display. The value of “U SUP6 SPM6“ should be in the range between 11 and 14 V DC.
5. While displaying “U SUP6 SPM6“, remove the connector at X9.
– If “U SUP6 SPM6” is now inside the correct above range (11 – 14 V DC), the display and or power module is defective. Test with another display and or power module.
– If “U SUP6 SPM6” is still outside the above range, proceed to next step.
6. While displaying “U SUP6 SPM6“, disconnect display and or power module from the terminals according to wiring schematics inside in the control cabinet.
– If “U SUP6 SPM6” is now inside the above range the cable for the display and or power module is defective. Mount connector correctly or replace connector cable for display and or power module.
– If the correct voltage is measured at X11 then circuit is defective.
7. Replace main controller.
8. Ensure the controller has the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage U sensor bus below 10 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>974</th><th colspan="5">Sensor bus sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective 12 V power supply to sensor bus.
• Defective main controller.
• Short circuit between 24 V DC and 12 V DC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 12 V signals to see if power supply has an short circuit or other damages. If the correct voltage is measured at X11 then circuit is defective.
4. Replace main controller.
5. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Reference voltage sensor bus above 14 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement and damage to sensors.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>975</th><th colspan="5">Internal sup LO</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">12 V supply voltage low on SMC6.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective 12 V power supply on SMC6.
• Defective main controller.
• Short circuit on SUP6 and SPM6 or RH sensor and CO sensor.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms (AL 971 and or AL 972) Clear these alarms first using their trouble shooting.
3. (Future possibility)
Access the “special menu” by pressing  for more than 3 sec. Scroll down until you see the label “SUP6 SPM6” in the display. The value of “U SUP6 SPM6“ should be in the range between 10 and 14 V DC.
4. While displaying “U SUP6 SPM6“, remove the connector at X10.
– If “U SUP6 SPM6” is inside the correct range at X11 pin 1 and 4, the display and or power module is defective. Test with another display and or power module.
– If “U SUP6 SPM6” is still outside the above range, proceed to next step.
5. While displaying “U SUP6 SPM6“, disconnect RH at X10 and measure voltage. If not in-range, SMC6 may be defective or have insufficient supply at X1. If in-range, check SUP6 at X80 and SPM6 at X41.</td></tr>
<tr><td>Criteria</td><td colspan="6">Internal power supply below 10 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurements.</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>976</th><th colspan="5">Internal sup HI</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">12 V supply voltage high on SMC6.</td></tr>
<tr><td>Cause</td><td colspan="6">• Defective 12 V power supply.
• Defective main controller.
• Short circuit between 24 V DC and 12 V DC.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check if there are other active (sensor) alarms. Clear these alarms first using their trouble shooting.
3. Check voltage level of 24 V DC and 12 V signals to see if power supply has an short circuit or other damages. If the correct voltage is measured at X11 then circuit is defective.
4. Replace main controller.
5. Ensure the controller has the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Internal power supply above 14 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurements and risk for damage to sensors.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in alarm list when supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>977</th><th colspan="5">Pmem sens sup LOW</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Controller defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See trouble shooting for accompanying alarms.</td></tr>
<tr><td>Criteria</td><td colspan="6">Voltage < 4.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in the alarm list when the supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>978</th><th colspan="5">Pmem sens sup HIGH</th><th>Log</th></tr>
<tr><td>Description</td><td colspan="6">Controller internal voltage reference fault.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Defective power supply for main controller.
• Defective Pmem pressure transmitter.
• Defective main controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. See trouble shooting for accompanying alarms.</td></tr>
<tr><td>Criteria</td><td colspan="6">Voltage > 5.50 V DC.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td></td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Less accurate readings from measurement.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm will be marked as inactive in the alarm list when the supply voltage is correct. Alarm may then be deleted.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>Minimum value</td><td>Maximum value</td><td>Actual</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>990</th><th colspan="5">Firmware update fail</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Failed to activate firmware.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Operating software is not compatible with hardware (SUP6, SMC6, SPM6).</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Test the software with unit of the same type as the failing one. If software is running then see 3.
3. There is still a fault on either SUP6, SMC6, SPM6.</td></tr>
<tr><td>Criteria</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>SMC6</td><td>SUP6</td><td>SPM6</td><td colspan="2">SCC6</td></tr>
</table>

<table>
<tr><th>991</th><th colspan="5">Config model code</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Model code missing.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• New software.
• New controller.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Go to service menu. Select configuration S05 and F10. Select model code according to Data Decal (placed on the unit).</td></tr>
<tr><td>Criteria</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6"></td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

<table>
<tr><th>994</th><th colspan="5">Req min SW352-11</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">The software which has been uploaded to the controller is not compatible with the current hardware version, please use software 0352 rev. 11 or newer.</td></tr>
<tr><td>Cause</td><td colspan="6">• Software not compatible.</td></tr>
<tr><td>Criteria</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Update failed.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Update failed</td></tr>
<tr><td>Elimination</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
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<table>
<tr><th>995</th><th colspan="5">Control internal error</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Controller module must be replaced.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Internal memory error.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Replace controller module.
3. Ensure the controller have the latest software version installed, otherwise update the software if possible and make sure the container ID and configuration is set correctly.</td></tr>
<tr><td>Criteria</td><td colspan="6">Type 0 (parameter 1 in the event log): Wrong dataflash page size.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Power cycle could lead to non operating controller. Possible corruption of datalog.</td></tr>
<tr><td>Elimination</td><td colspan="6">Replace main controller module.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td>FPSize</td><td></td><td colspan="2"></td></tr>
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<table>
<tr><th>998</th><th colspan="5">Could not detect CA</th><th>Alarm</th></tr>
<tr><td>Description</td><td colspan="6">Uanble to detect CA.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Broken communication.
• COMCA cable defective (for some models).
• Heating element defective.
• Contactors defective K10.
• Controler module defective.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. Check connections according to the wiring schematic.
3. Restart the unit.
4. See trouble shooting for AL 653.</td></tr>
<tr><td>Criteria</td><td colspan="6">Could not detect CA module in time (up until 10 min. from start up).</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6">Cannot run CA mode.</td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Slow flash</td></tr>
<tr><td>Consequence</td><td colspan="6">Cannot pass CA PTI.</td></tr>
<tr><td>Elimination</td><td colspan="6">Alarm may be deleted after the test is complete.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td>CA mode</td><td>CA communication</td><td>Idle current sum</td><td colspan="2">Hpump on current sum</td></tr>
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<table>
<tr><th>999</th><th colspan="5">Keypad failure</th><th>Warning</th></tr>
<tr><td>Description</td><td colspan="6">Indication of defective keypad or connection.</td></tr>
<tr><td>Cause</td><td colspan="6">• Unexpected behaviour in old software version.
• Corrosion in the keypad ribbon connector CN8.
• Defective keypad.</td></tr>
<tr><td>Trouble shooting</td><td colspan="6">1. Try to correct the error by uploading the latest software version to the controller.
2. If any accompanied alarms are active, handle these first.
3. Disconnect X80 from the user panel and unscrew the 4 fasteners.
4. Locate the side locking ramp tabs of the ribbon connector CN8.
5. Gently pull the locking ramp tabs away from CN8, keeping both sides parallel.
6. Gently remove the ribbon. Using multi-purpose precision lubricant CRC 2-26 (item number 818651A) or similar electro cleaner and lubricator, clean the contact end of the ribbon and the inside surfaces of the CN8 connector.
7. Feed the ribbon back into the CN8 connector until it stops.
8. Push both sides of the locking ramp tabs toward CN8 until locked.
9. Refit the back cover, reconnect X80 and test the user panel keypad operation.
10. If alarm is still active, replace the user panel.</td></tr>
<tr><td>Criteria</td><td colspan="6">A key has been pressed at least 20 times during 1 hour.
Corrosion in the keypad ribbon connector CN8.</td></tr>
<tr><td rowspan="2">Controller action</td><td colspan="6"></td></tr>
<tr><td>Log</td><td>X</td><td>Alarm</td><td>X</td><td>Alarm light</td><td>Off</td></tr>
<tr><td>Consequence</td><td colspan="6">Menus can change automatically. The controller can be power up in battery mode automatically.</td></tr>
<tr><td>Elimination</td><td colspan="6">Clean the CN8 connection.</td></tr>
<tr><td rowspan="2">Log data</td><td>Parm 1</td><td>Parm 2</td><td>Parm 3</td><td>Parm 4</td><td colspan="2">Parm 5</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
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Star Cool Service

The app

For troube shooting help, manuals, alarm codes and more, download our free Star Cool Service app by simply scanning the QR code with your smart device.

See more at **apps.starcool.com**

Training

Our expert service team offer a variety of comprehensive seminars and hands-on instruction all around the world. From basic knowledge to advanced trouble shooting, we tailor courses to meet your needs.

Also, our online e-learning portal provides interactive modules, videos, and quizzes.

Contact us at **training@starcool.com**

Spare parts

By using only genuine Star Cool spare parts and consumables, you ensure a long and reliable life time of your reefer machines.

Purchase parts quickly and reliably on our website and choose the preferred delivery option to suit you.

Ordering support at **sales@starcool.com**

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Fax: +45 73 64 35 69
E-mail: starcool@starcool.com
www.starcool.com

24-hour hotline support

Call us on +45 73 64 35 00 or send an e-mail to service@starcool.com. Our service department is available 24 hours a day, 7 days a week - providing easy access to the answers you need.

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