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General

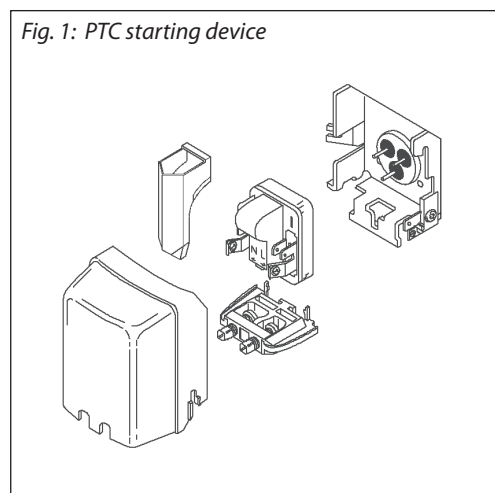
This section is directed especially to the service network, for household appliances and similar. It deals mainly with PL, TL, NL and FR compressors for 220-240V. For detailed information on compressors see the data sheets.

Compressors type PL, TL, NL, FR and partly SC are equipped with a PTC starting device (fig. 1) or a relay and start capacitor (fig. 2). The motor protector is built into the windings.

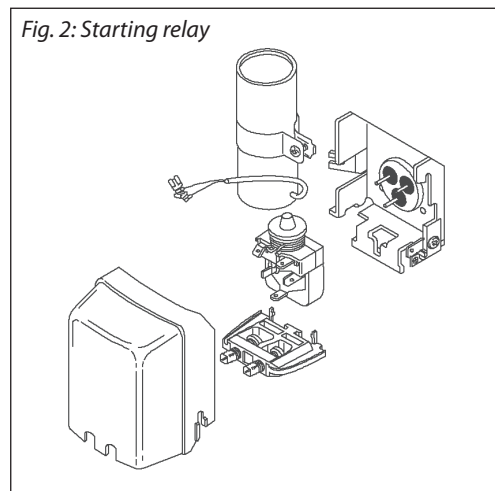
In the event of a start failure, with a cold compressor, up to 15 minutes can elapse before the protector cuts out the compressor.

When the protector cuts out and the compressor is warm, it can take up to 1 hour before the protector cuts in the compressor again.

The compressor must not be started without the electrical equipment.

Fig. 1: PTC starting device


Am0_0069

Fig. 2: Starting relay


Am0_0070

Fault location

Before beginning systematic fault location, a good rule is to cut the supply voltage for at least 5 minutes. This ensures that the PTC starting device has cooled off and is ready for start.

A voltage drop or blackout within the first minutes of a pull down of the appliance with cold compressor, can lead to an interlocking situation.

A compressor with PTC can not start at non equalized pressure and the PTC does not cool down so fast. It can take more than 1 hour until the appliance then operates normally again.

Electrical compressor quick check

To avoid unnecessary protector operation and consequent waiting time, it is important to carry out fault location in the sequence given below. Tests are made according to descriptions on following page.

- Remove electrical equipment
- Check electrical connection between main and start pins of compressor terminal
- Check electrical connection between main and common pins of Compressor terminal
- Replace compressor, if above connection checks failed
- Else, replace electrical equipment

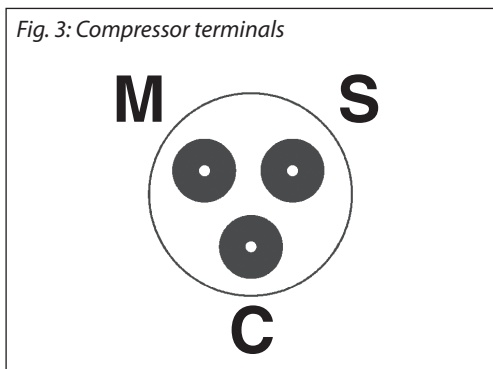
If the compressor still does not operate, most probably it is no electrical compressor failure. For more detailed fault location, see the tables.

Check main and start winding

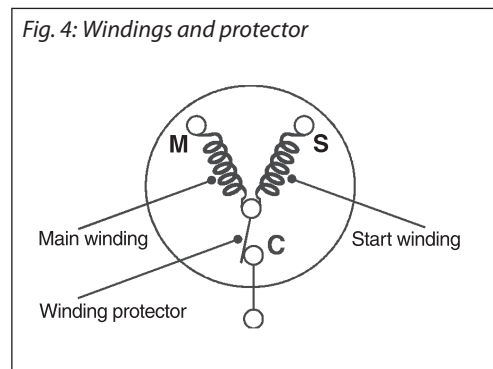
- Resistance between pins M (main) and S (start) on compressor terminals is measured with an ohm-meter, see fig. 3.

Connection →	Main and start windings normally OK →	Replace relay	
No connection →	Main or start winding defective →	Replace compressor	

At cold compressor (ca. 25°C) the values are ca. 10 to 100 Ohm for 220-240 V compressors. For partial short circuit detection, exact values are needed from data sheets of the specific compressor, which can be found on the Danfoss Compressors homepage.



Am0_0071



Am0_0072

Check protector

- Resistance between pins M (main) and C (common) on compressor terminals is measured with an ohm-meter, see fig. 3 and 4.

Connection →	Protector OK		
No connection →	Compressor cold →	Protector defective →	Replace compressor
	Compressor hot →	Protector could be OK, but cut out →	Wait for reset

Check relay

- Remove relay from compressor.
- Measure connection between connectors 10 and 12 (see fig. 5):

No connection →	Relay defective →	Replace relay	
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- Measure connection between connectors 10 and 11:
- In normal vertical position (like mounted, solenoid upward):

Connection →	Relay defective →	Replace relay	
No connection →	OK		

- In top-down position (solenoid downward):

Connection →	OK		
No connection →	Relay defective →	Replace relay	

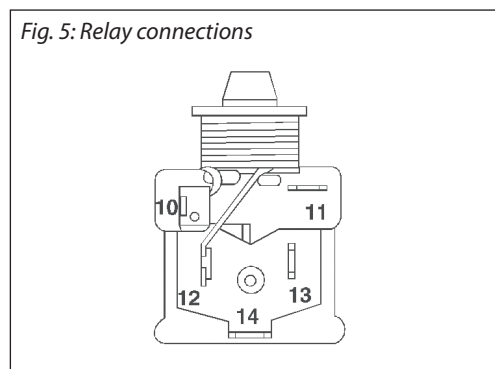
Check PTC

- Remove PTC from compressor.
- Shake by hand. Pin C can slightly rattle.

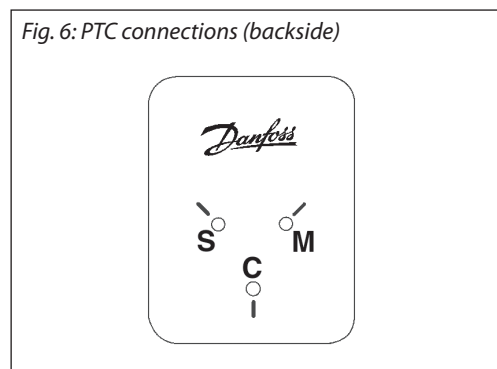
Internal rattle noise (except pin C) →	PTC defect →	Replace PTC	
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- Measure resistance between pins M and S, see fig. 6.
- Resistance value between 10 and 100 Ohm at room temperature for 220 V PTC.

Connection →	PTC working →	OK	
No connection →	PTC defect →	Replace PTC	

Fig. 5: Relay connections


Am0_0073

Fig. 6: PTC connections (backside)


Am0_0074

Fault location

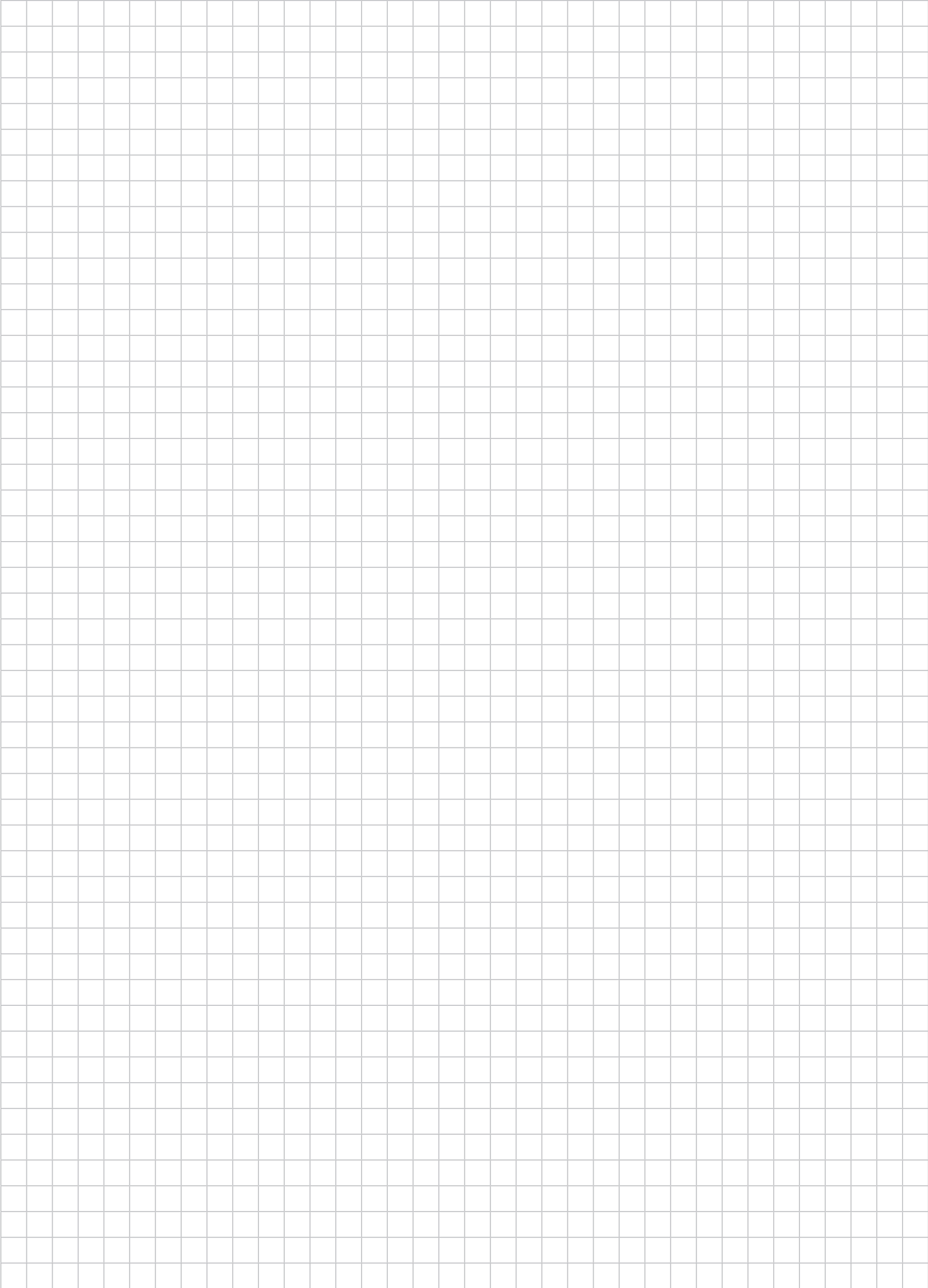
Most common fault reasons, detectable before dis-mounting compressor.

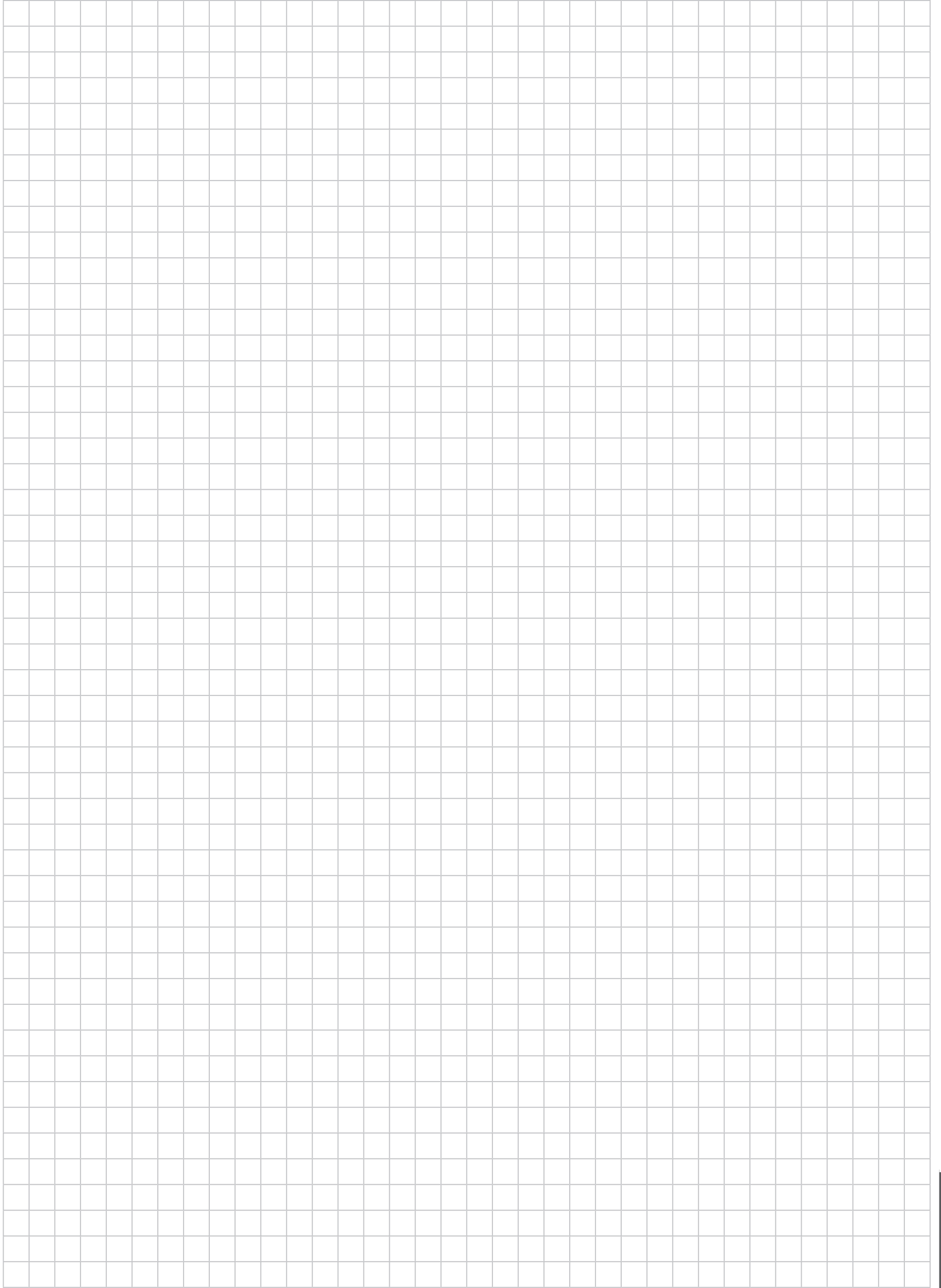
Customer claim	First analysis	Possible cause	Check	Activity (depends on result)
No/reduced cooling	Compressor does not run	Compressor gets no or bad power supply	Voltage at plug and fuse	
			Appliance energized	
			Thermostat function	
			Cables and connections in appliance	
			Voltage at compressor terminals	
		Defective relay	Relay function by shaking to hear if armature is working	Replace relay
		Defective start cap	Start capacitor function	Replace start capacitor
		PTC defective	PTC by shaking	Replace if noise appears
			PTC resistance 10 to 100 Ohm between M and S pin	Replace PTC, if not 10 to 100 Ohm
		Compressor with PTC can not start at pressure difference	Stop time long enough for pressure equalization	Adjust thermostat difference
		PTC defective	PTC resistance 10 to 100 Ohm between M and S pin	Replace PTC
		Relay defective	Relay function by shaking, to hear moving of armature	Replace relay and capacitor
		Compressor overloaded	Condenser pressure and ventilation	Ensure proper ventilation
			Ambient temperature too high according to type label of appliance	
	Defective motor windings	Check winding resistances	Replace compressor	
	Defective protector	Check protector with ohmmeter	Replace compressor	
	Mechanically blocked compressor	Start with proper starting equipment, voltage and conditions, windings and protector OK	Replace compressor	
	Compressor runs 100%	No or low refrigerant charge	Recharge and search for leaks	Ensure leakfree system and proper charge
			Ambient temperature according to type label of appliance	Replace drier
		Too high condensing temperature	Condenser and compressor ventilation	Ensure proper ventilation and wall distance
		Capillary partly blocked	Recharge and search for leaks, measure suction pressure. Capillary blocked, if pressure very low	
		Valves coked or damaged	Recharge and search for leaks	Replace compressor, if still not cooling properly
Compressor runs on/off	Thermostat not OK	Thermostat type and function	Replace thermostat	
	Ice block built up on evaporator	Wrong refrigerant charge	Recharge and search for leaks	Ensure leakfree system and proper charge,
		Check for ice on evaporator	Replace drier	
		Thermostat function and settings	Defrost properly	
	Compressor trips on motor protector	Internal no-frost fan function	Replace thermostat	
		Compressor load, compressor and condenser ventilation	Ensure proper ventilation and wall distance	
		Compressor voltage supply for minimum 187 V	Ensure proper power supply	
Compressor voltage supply for drop outs. Check thermostat and appliance cables for loose connections		Fix all connections		
Motor windings resistance for partly short circuit or earth connection	Replace compressor			

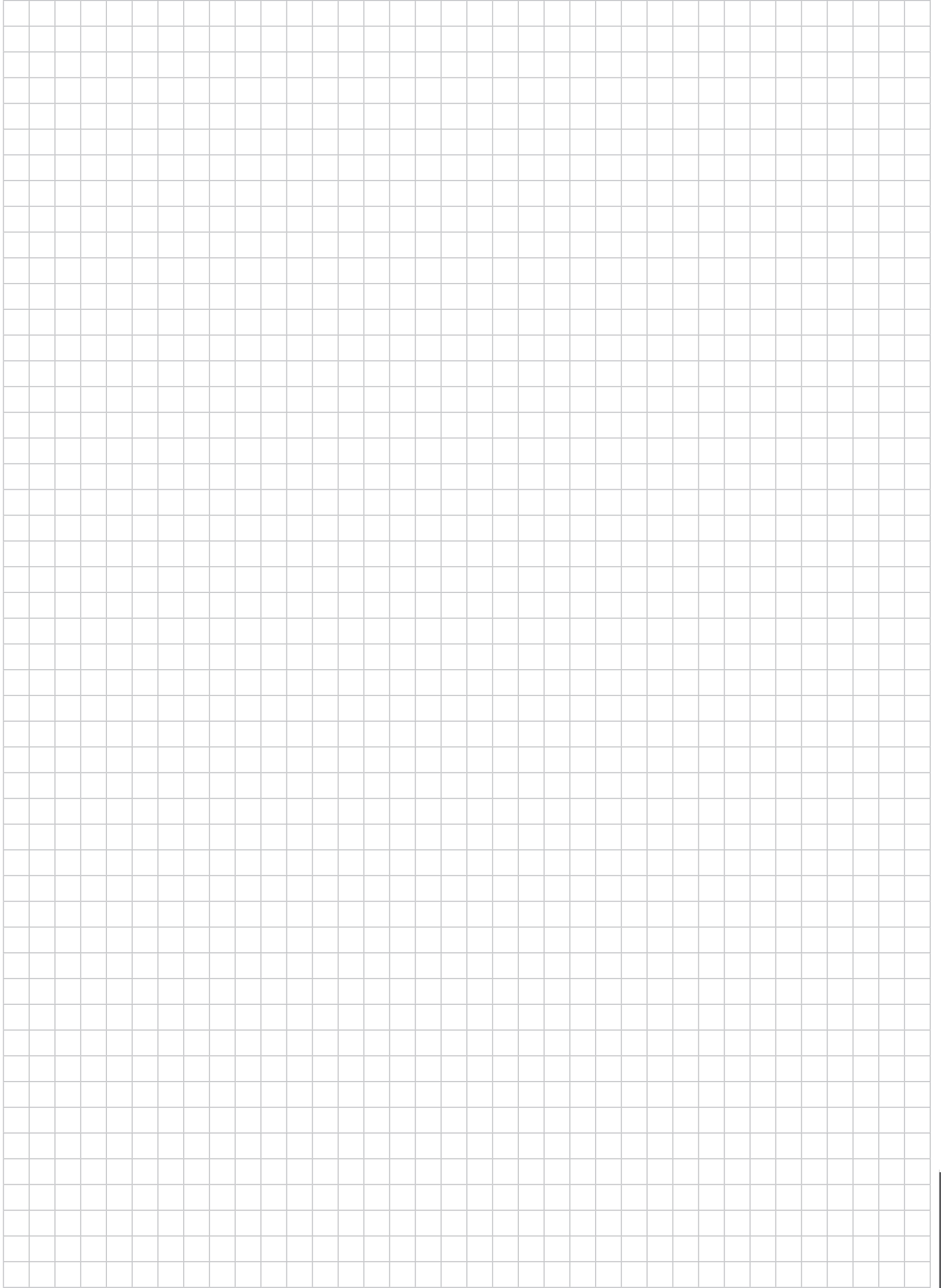
Fault location
(continued)

Customer claim	First analysis	Possible cause	Check	Activity (depends on result)		
Noise	Rattle or humming	Tube touching cabinet	Tube placing	Bend tube to their right place, carefully		
		Compressor touching cabinet	Compressor mounting and rubber feet	Place rubber feet and mounting accessories correctly		
		Broken internal suspension spring or discharge tube	Listen to compressor with screw-driver against compressor with edge and to your ear with grip	Replace compressor, if abnormal sounds		
		Resonance	Find vibrating mounting parts	Place or fix correctly		
		Fan noise	Vibration of fan or fan mounting	Fix fan and blade, replace, if defective		
	Banging at start or stop of compressor	Compressor block hitting housing internally	Compressor overload by pressure		Clean condenser if dusty. Make sure, that ventilation gaps for air circulation are satisfactory	
			Fan function			
			Refrigerant charge		Recharge, if too high	
			Pressure equalization before start and number of on/off cycles		Adjust thermostat, if stop time less than 5 min	
	Relay clicking frequently after start	Compressor over-loaded	Ventilation to compressor and condenser. Check fan function		Clean condenser if dusty. Make sure, that ventilation gaps for air circulation are satisfactory	
		Relay defective	Right relay type for compressor		Replace relay, if wrong	
	Fuses are blown by appliance	Short circuit in appliance	Defective cabling in appliance	All connecting cables and power supply cord for loose connections, short circuits	Fix connections properly	
Defective thermostat			Thermostat connections	Fix connections properly		
Ground connection			Resistance from line/neutral to earth			
Short circuit in compressor		Defective terminals	For burns on the terminal pins		Replace electrical accessories	
		Short circuit between cables at terminals	Connectors and cables at compressor		Insulate cables and connectors	
		Short circuit in compressor motor	Resistance values in windings Resistance between terminals and earth		Replace compressor, if short circuited	
Fuse blows at compressor start		Supply voltage too low	Supply voltage at compressor start >187 V			
		Fuse loaded by too many appliances	Total fuse load		Connect appliance to different fuse	
		Resettable fuse too quick acting	Fuse load and type		If possible replace by slightly slower type	
Starting capacitor exploded		Partly short circuit to earth	Resistance between terminals and earth		Replace compressor, if short circuited	
		Defective relay	Relay function by shaking, to hear moving of armature		Replace relay and capacitor	
			Wrong relay type	Relay type		Replace relay and cap
			Extremely many starts and stops of compressor	Relay type Thermostat defect or differences too small		Replace relay and cap Adjust or replace thermostat
Starting relay cap blown off		Short circuit in compressor motor	Compressor motor resistances		Replace compressor	

Notes







Notes

