

Differential pressure controls type MP 54, 55 and 55A

Introduction



MP 54 and MP 55 oil differential pressure controls are used as safety switches to protect refrigeration compressors against low lubricating oil pressure. If the oil pressure fails the oil differential pressure control stops the compressor after a certain time period. MP 54 and 55 are used in refrigerating systems using fluorinated refrigerants.

MP 55A is used in refrigerating systems with R 717 (NH₃). MP 55A can also be used in systems with fluorinated refrigerant. MP 54 has a fixed differential pressure setting. It also incorporates a thermal time relay with a fixed release time setting. MP 55 and 55A have adjustable differential pressure and are available both with and without thermal time relay.

Features

- *Wide regulating range*
Can be used for deep freeze, refrigeration and air conditioning plant
- *Can be used for all normal fluorinated refrigerants*
- *Electrical connection at the front of the unit*
- *Suitable for both alternating and direct current*
- *Screwed cable entry for cables from 6 to 14 mm diameter*
- *Small contact differential*
- *Meets the requirements of EN 60947*

Approvals

- | | |
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| <ul style="list-style-type: none"> Ⓓ DEMKO, Denmark Ⓝ NEMKO, Norway Ⓕ FIMKO, Finland DSRK, Deutsche-Schiffs-Revision und -Klassifikation, Germany Ⓟ Polski Rejestr Statków, Poland Ⓒ Germanischer Lloyd, Germany | <p>EZU, The Czech Republic
RINA, Italy
CE mark according to EN 60947-5</p> <p>Versions having UL and CSA approvals can be supplied to special order.</p> |
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Materials in contact with the medium

Unit type	Material
MP 54 MP 55	Stainless steel 19/11, no. 1.4306 to DIN 17440 Deep-drawn steel plate, no. 1.0338 to DIN 1624 Free cutting steel, no. 1.0718 to DIN 1651
MP 55A	Stainless steel 19/11, no. 1.4306 to DIN 17440 Deep-drawn steel plate, no. 1.0338 to DIN 1624 Free cutting steel, no. 1.0401 to DIN 1652

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Technical data

Control voltage
230 V or 115 V a.c. or d.c.

Max. bellows temperature
100°C

Permissible voltage variation
+10 → -15%

Enclosure
IP 20 to IEC 529

Max. working pressure
PB = 17 bar

Contact loads

Type A:

On time relay output contacts M-S:

AC15: 2 A, 250 V

DC13: 0,2 A, 250 V

Max. test pressure
p' = 22 bar

Type B without time relay:

AC15: 0,1 A, 250 V

DC13: 12 W, 125 V

Temperature compensation
The time relay is temperature-compensated in the range -40 to +60°C

Screwed cable entry
Pg 13.5

Type C without time relay:

AC1: 10 A, 250 V

AC3: 4 A, 250 V

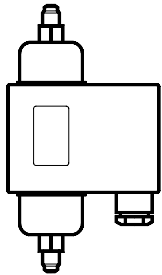
DC13: 12 W, 125 V

Cable diameter
6 → 14 mm

Ordering

For fluorinated refrigerants

Type	Differential Δp bar	Switch differential max. Δp bar	Operation range, LP side bar	Time relay release time s	Contact load (see technical data)	Code no.		
						Connection		
						1/4 in./6 mm Flare	1 m cap.tube 1/4 in. ODF solder	Cutting ring 6 mm
MP 54	Fixed 0.65	0.2	-1 → +12	0 ²⁾	B	60B0297		
	Fixed 0.65	0.2	-1 → +12	45	A	60B0166		
	Fixed 0.9	0.2	-1 → +12	60	A	60B0167		
	Fixed 0.65	0.2	-1 → +12	90	A	60B0168		
	Fixed 0.65	0.2	-1 → +12	120	A	60B0169³⁾		
	Fixed 2.1	0.2	-1 → +12	120	A	60B0180		
MP 55	0.3 → 4.5	0.2	-1 → +12	45	A	60B0170	60B0133	60B0187
	0.3 → 4.5	0.2	-1 → +12	60	A	60B0171	60B0134	60B0188
	0.3 → 4.5	0.2	-1 → +12	60	A	60B0178¹⁾		60B0191¹⁾
	0.3 → 4.5	0.2	-1 → +12	90	A	60B0172	60B0135	60B0189
	0.3 → 4.5	0.2	-1 → +12	120	A	60B0173	60B0136	60B0190
	0.3 → 4.5	0.2	-1 → +12	0 ²⁾	B	60B0299		60B0295
	0.65 → 4.5	0.4	-1 → +12	0 ²⁾	C	60B0294⁴⁾		



For fluorinated refrigerants and R717 (NH₃)

Type	Differential Δp bar	Switch differential max. Δp bar	Operation range, LP side bar	Time relay release time s	Contact load (see technical data)	Code no.	
						Connection	
						Ø 6,5 / Ø 10 mm weld nipple	Cutting ring 6 mm
MP 55A	0.3 → 4.5	0.2	-1 → +12	45	A	60B0174	60B0182
	0.3 → 4.5	0.2	-1 → +12	60	A	60B0175	60B0183
	0.3 → 4.5	0.2	-1 → +12	60	A	60B0179¹⁾	60B0186¹⁾
	0.3 → 4.5	0.2	-1 → +12	90	A	60B0176	60B0184
	0.3 → 4.5	0.2	-1 → +12	120	A	60B0177	60B0185
	0.3 → 4.5	0.2	-1 → +12	0 ²⁾	B	60B0298²⁾	60B0296

¹⁾ With operational light that remains on during normal operation.

Note: If the operational light goes out, the compressor should not run longer than the release time.

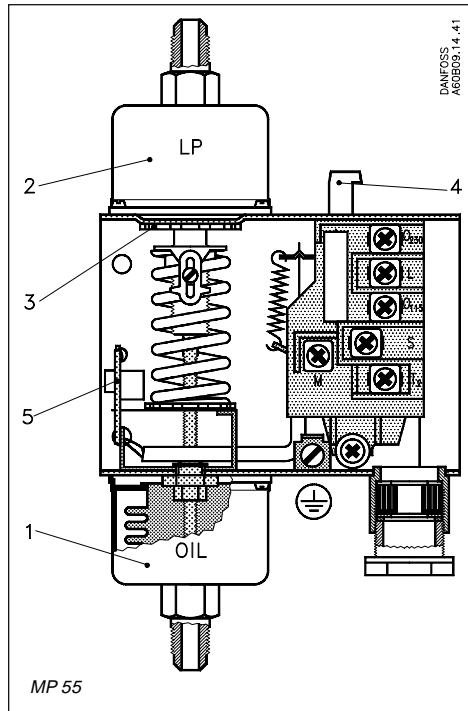
²⁾ Versions without time relay are for applications where an external time relay is required - perhaps with a different release time than the one specified.

³⁾ 60B0169 meets Copeland specifications. UL-approved versions can be supplied.

⁴⁾ Approved according to EN 60947-4, -5.

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Design



1. Connection to pressure side of lubrication system, OIL
2. Connection to suction side of refrigeration plant, LP
3. Setting disc
4. Reset button
5. Test device

The operation of the pressure control is conditional only on the differential pressure, i.e. the difference in pressure between the two counteracting bellows, whereas it is independent of the absolute pressure acting on both bellows.

The MP 55 and 55A can be set for different differential pressures by the setting disc (3). The set differential pressure can be read from the internal scale.

The MP 54 has a fixed differential and has no pressure setting disc. The factory-set differential pressure is stamped on the front plate of the control.

Terminology

Differential range

The pressure difference between LP and OIL connections within which the control can be set to operate.

Scale reading

The differential between the oil pump pressure and the pressure in the crankcase that exists at the moment the contact system cuts in current to the time relay on falling oil pressure.

Operating range

The pressure range on the LP connection within which the control can operate.

Contact differential

The pressure rise above the set differential pressure (scale reading) necessary to cut off current to the time relay.

Release time

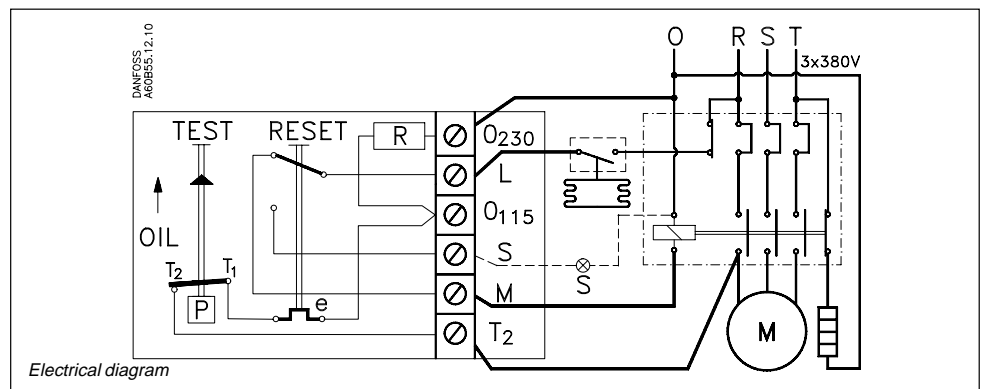
The period for which the differential pressure control allows the compressor to run with too low an oil pressure during start-up and operation.

Function

If there is no oil pressure on starting, or if the oil pressure falls below the set pressure during operation, the compressor will stop after the release time has elapsed. The electrical circuit is divided into two completely separate circuits, a safety circuit and an operational circuit.

The timer (e) in the safety circuit is activated when the effective lubricating oil pressure, *the oil differential pressure* (the difference between the oil pump pressure and suction pressure), is lower than the set value.

The timer is deactivated when the oil differential pressure is more than the set value plus the contact differential.

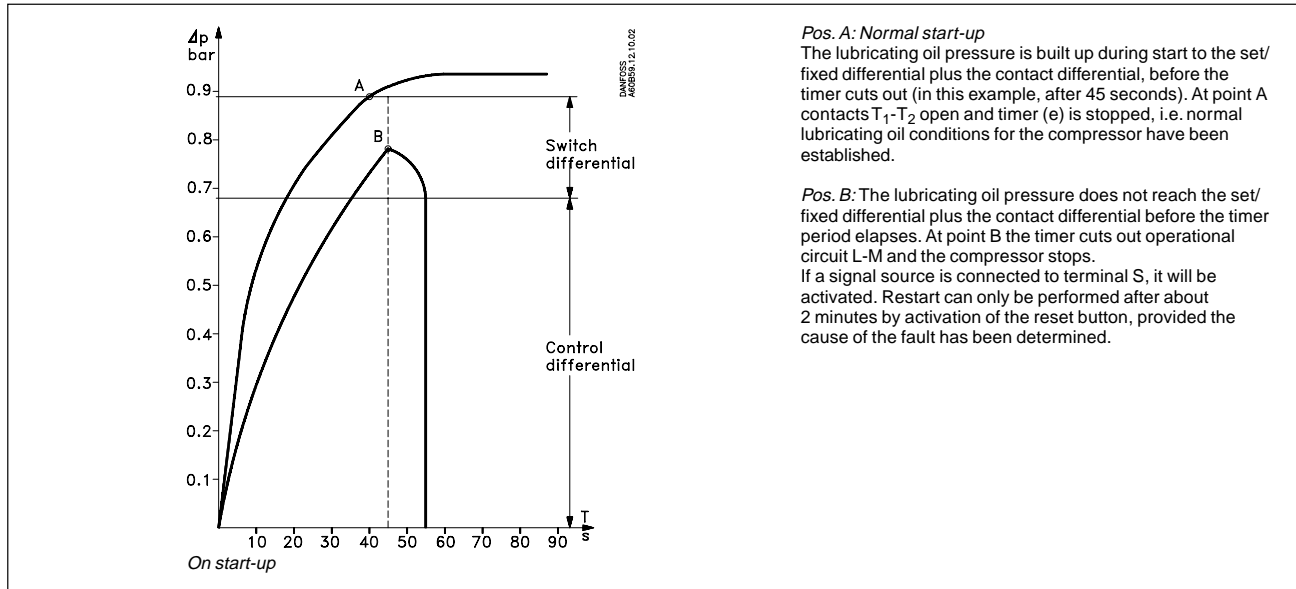


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Function (continued)

The two diagrams below explain the terms "oil differential pressure" and "contact differential", both have to be considered when using oil differential pressure controls.

The first diagram shows the function of the differential control during start; the second shows the function of the control during operation.

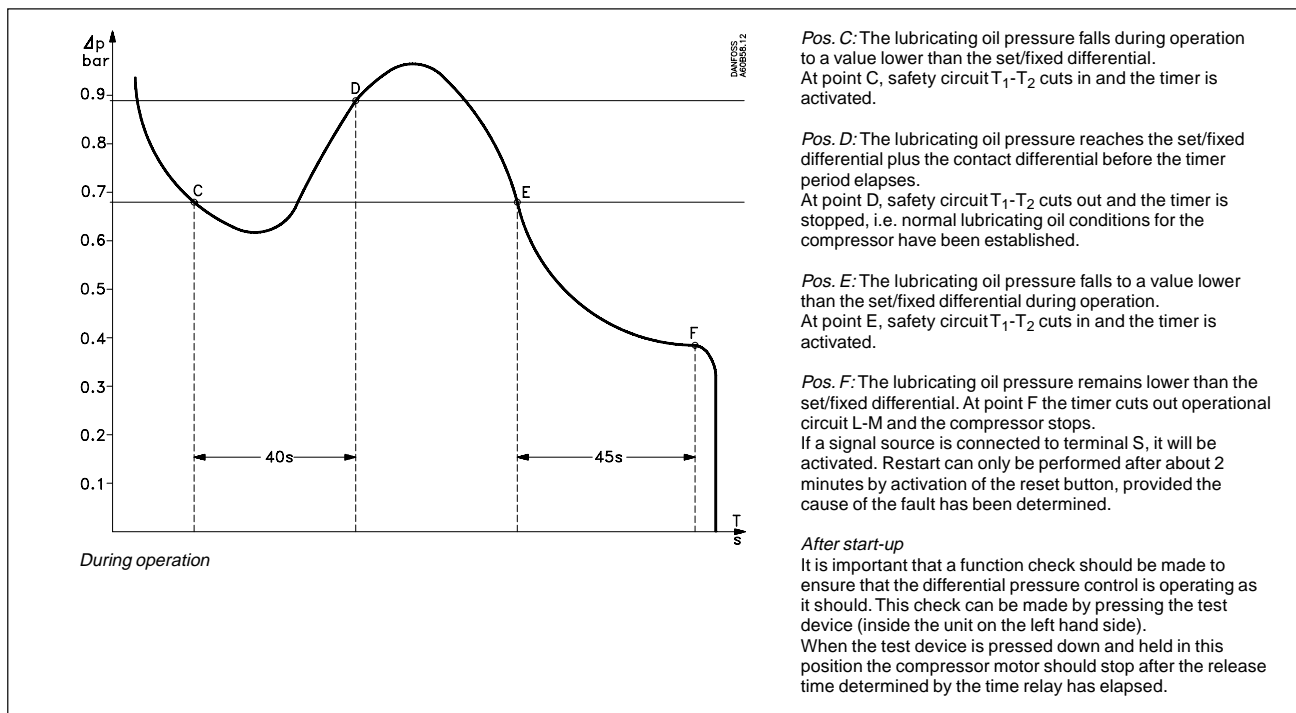


Pos. A: Normal start-up

The lubricating oil pressure is built up during start to the set/ fixed differential plus the contact differential, before the timer cuts out (in this example, after 45 seconds). At point A contacts T_1 - T_2 open and timer (e) is stopped, i.e. normal lubricating oil conditions for the compressor have been established.

Pos. B: The lubricating oil pressure does not reach the set/ fixed differential plus the contact differential before the timer period elapses. At point B the timer cuts out operational circuit L-M and the compressor stops.

If a signal source is connected to terminal S, it will be activated. Restart can only be performed after about 2 minutes by activation of the reset button, provided the cause of the fault has been determined.



Pos. C: The lubricating oil pressure falls during operation to a value lower than the set/ fixed differential. At point C, safety circuit T_1 - T_2 cuts in and the timer is activated.

Pos. D: The lubricating oil pressure reaches the set/ fixed differential plus the contact differential before the timer period elapses. At point D, safety circuit T_1 - T_2 cuts out and the timer is stopped, i.e. normal lubricating oil conditions for the compressor have been established.

Pos. E: The lubricating oil pressure falls to a value lower than the set/ fixed differential during operation. At point E, safety circuit T_1 - T_2 cuts in and the timer is activated.

Pos. F: The lubricating oil pressure remains lower than the set/ fixed differential. At point F the timer cuts out operational circuit L-M and the compressor stops. If a signal source is connected to terminal S, it will be activated. Restart can only be performed after about 2 minutes by activation of the reset button, provided the cause of the fault has been determined.

After start-up

It is important that a function check should be made to ensure that the differential pressure control is operating as it should. This check can be made by pressing the test device (inside the unit on the left hand side).

When the test device is pressed down and held in this position the compressor motor should stop after the release time determined by the time relay has elapsed.

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Dimensions and weight

