

Data Sheet

Oil level Regulators **COM**



Danfoss COM oil level regulators are an integral part of oil management in refrigeration, air conditioning and heat pump systems. COM oil level regulators ensure an optimal oil level in scroll, semi-hermetic and reciprocating compressors. This in turn provides safe compressor operation and long compressor lifetime.

Danfoss COM oil level regulators use hall sensor and built-in magnetic float for very precise oil level sensing. This design ensures a reliable performance even with foaming or dirty oil and ensures long life of the compressor even under different operating conditions such as defrost cycles and seasonal variations.

Features

- Higher resolution on the continuously.
- Hall sensor level sensing
- Lower energy consumption
- Lower weight
- Less complexity, only 2 models. 60 bar/130bar
- Adaptive functions
 - Power on logic
 - Emergency injection logic

Functions

Maintaining an adequate oil level is a critical requirement for ensuring the long-term durability of a compressor. Depending on the system's design, such as in rack applications, achieving precise oil level control under various operating conditions necessitates the use of an active regulation system. Passive systems, on the other hand, pose challenges because they function effectively only when the operating conditions remain constant. However, due to seasonal variations, maintaining constant conditions is often impractical.

Active oil regulation systems are designed to adapt to fluctuations in operating conditions and defrost cycles, thereby ensuring reliable compressor operation. These active systems continuously monitor the oil level in compressors and generate alerts in the event of a low oil level. Even in cases where there is no built-in compressor oil pump and oil differential pressure switch (e.g., in scroll compressors), an active control system is essential for monitoring and maintaining the oil supply to the compressor.

A Hall sensor and a magnetic float system are integrated into the COM to gauge the oil level within the compressor. Depending on variations in the oil level and its impact on the magnetic field strength, a variable induced voltage is generated. This voltage is then assessed by the electronic system, triggering actions in the form of LED indicators, solenoid valve activations and relay.

Once the oil level reaches the predefined alarm threshold, COM activates an alarm condition. This signal can be employed for tasks such as disconnecting the compressor or data processing.

While the alarm condition persists, a continuous supply of oil is maintained to the compressor to restore the oil level to its normal range. Once this restoration is successful, the alarm is reset.

To promptly identify a compressor operating "without oil filling," a "Power on Logic" feature has been incorporated into the software. This feature eliminates the delay times associated with "Filling" and "Alarm." Consequently, it ensures that a compressor lacking oil filling does not run for alarm delay time before triggering an alarm but can be halted immediately.

The oil level indicator is divided into different ranges :

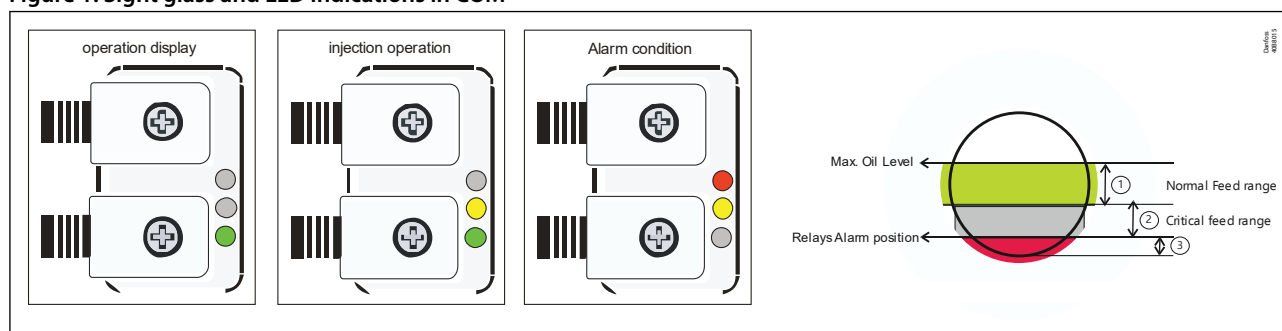
1. Normal oil level: 40-60% sight glass level.
2. Critical oil level: 25-40% sight glass level.
3. Alarm oil level: <25% sight glass level

When the green LED is illuminated, it indicates that the compressor is operational, and the oil level is within the normal range. During normal operation, if the oil level remains below the normal range for more than 10 seconds, the solenoid valve is activated, allowing oil to be replenished up to a maximum of 60% of the sight glass height. Subsequently, the solenoid valve closes. This 10-second delay serves a specific purpose, especially for certain compressor types and applications. During the compressor's startup phase, the oil level can fluctuate, and without this delay, the oil filling process might initiate even when there is sufficient oil present. The delay helps prevent overfilling of the compressor.

In low-pressure systems, if the oil level moves into the "critical area" despite active oil filling, it could be due to the compressor introducing more oil into the system than the COM can replenish. In such a scenario, the differential pressure (the difference between oil pressure and suction pressure) needs to be increased to allow sufficient oil flow back into the system. This can be accomplished by utilizing an ORD (Oil Return Valve) available with differential pressure options.

To prevent oil shortages, Danfoss oil management recommends keeping the COM operational even when the compressor is in the off condition. This ensures that the oil level is properly maintained, safeguarding against potential issues related to oil supply.

Figure 1: Sight glass and LED indications in COM



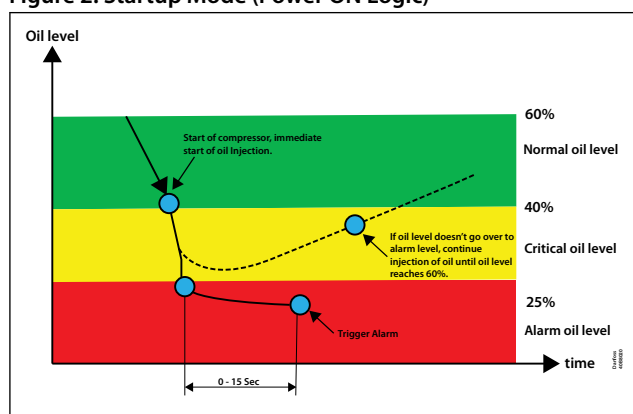
Startup Mode (Power ON Logic)

The Power ON Logic becomes active when both the compressor and Danfoss COM are initially turned on. Startup mode(power On logic) suppresses all alarm and injection delay. Injection of oil starts immediately.

- If level is below 40%, injection function starts, and immediately activate the injection solenoid valve, injection continues until 60% level achieved again.
- If level is below 25%, Alarm function start, and depending how much below 0-25% level is measured, the alarm delay is suppressed to 0-15 sec. This is mitigating the risk of compressor running without oil during start up.

On the other hand, if the oil level does not decrease to the Alarm Level during the startup mode phase, the Power ON Logic is disabled, and the COM functions in the Normal Operation Mode.

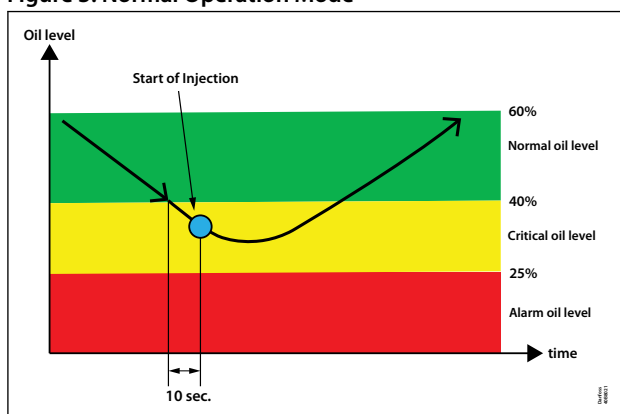
Figure 2: Startup Mode (Power ON Logic)



Normal Operation Mode

To ensure the compressor receives optimal lubrication, COM maintains the oil capacity within a range of 40-60%. If the oil level falls below the Normal Level, a delay counter comes into play. During the Normal Operation Mode, this counter prevents sudden fluctuations in the system and guards against overfilling the compressor. After a 10-second delay, the injection of oil commences. The electronic float's resistance to oil surges and foaming enables continuous monitoring of the oil level throughout the injection process until it reaches the Normal Level. This eliminates the need for breaks in the delay for intermediate measurements

Figure 3: Normal Operation Mode



Should the oil level decrease even further, falling below the Critical Level (in the range of 40-25%), despite ongoing oil injection, an alarm counter is initiated. This counter runs for 80 seconds and subsequently triggers an alarm relay. This relay's contact can be monitored and employed for various purposes, such as shutting down the compressor or activating an alarm routine (this depends on how the alarm of COM has been used in the system). It's important to note that even when the alarm relay is activated, the oil injection process continues. Only when the oil level surpasses 25% does the alarm get deactivated, but the injection of oil persists until the Normal Level is reached

Figure 4: Normal Operation Mode

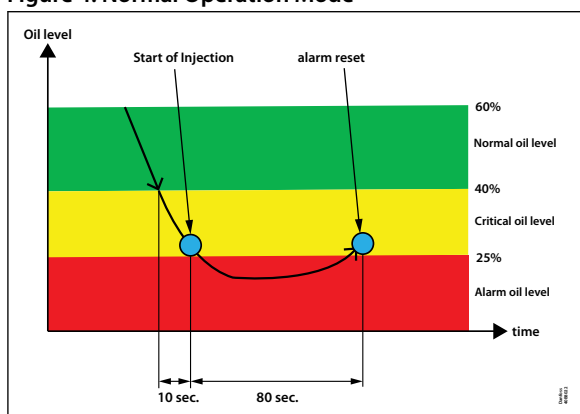
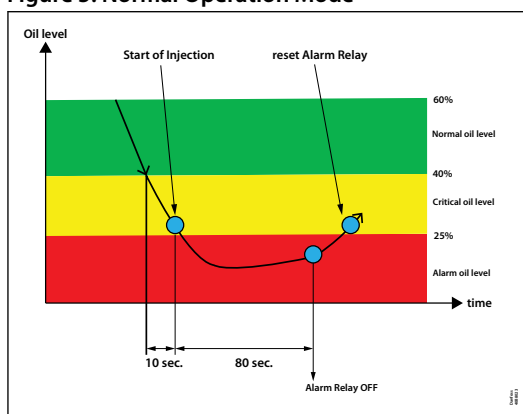


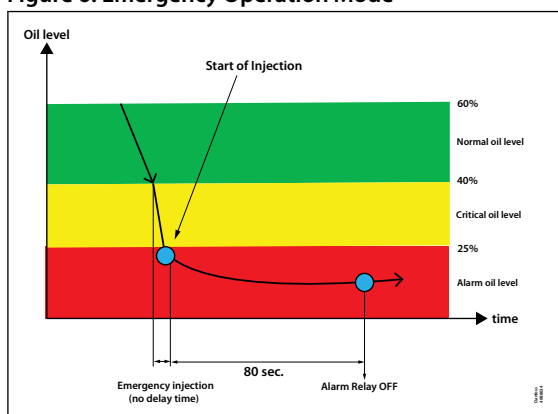
Figure 5: Normal Operation Mode



Emergency Operation Mode

If there is a sudden increase in oil consumption, as might occur with a frequency-modulated compressor, the oil level can rapidly drop from the Normal Level to the Alarm Level. Danfoss COM detects this abrupt drop in oil level. In such instances, the delay that is normally beneficial in Normal Operation Mode is swiftly deactivated, and oil injection begins immediately to address the sudden oil level decrease. The alarm delay timer starts and if persists for 80secs, the alarm will be turned On. The alarm delay timer starts and if persists for 80secs, the alarm will be turned On. If level again reach 40% within the 80 sec delay time, alarm function timer is resets, and the alarm relay does not activate.

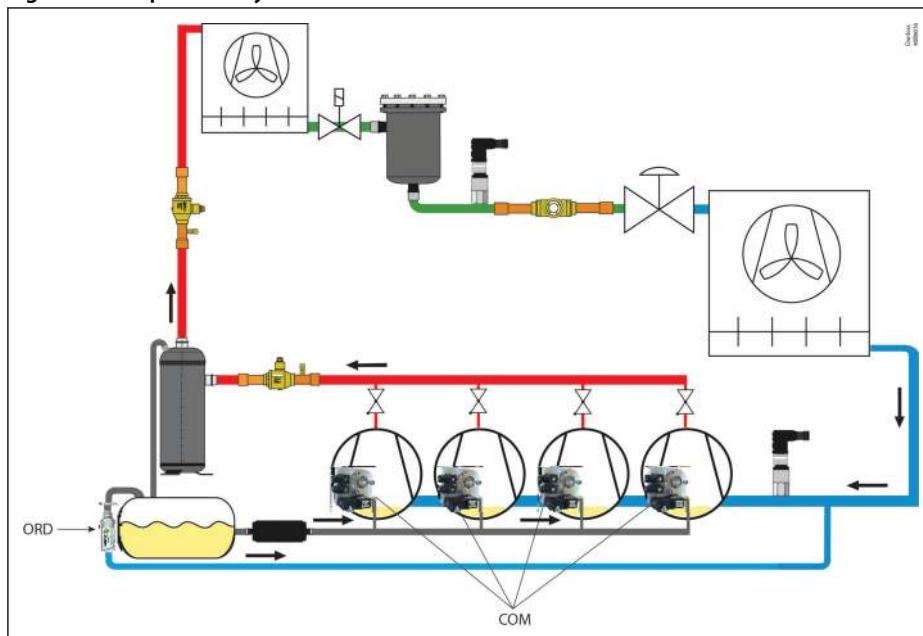
Figure 6: Emergency Operation Mode



Applications

Low pressure Oil system

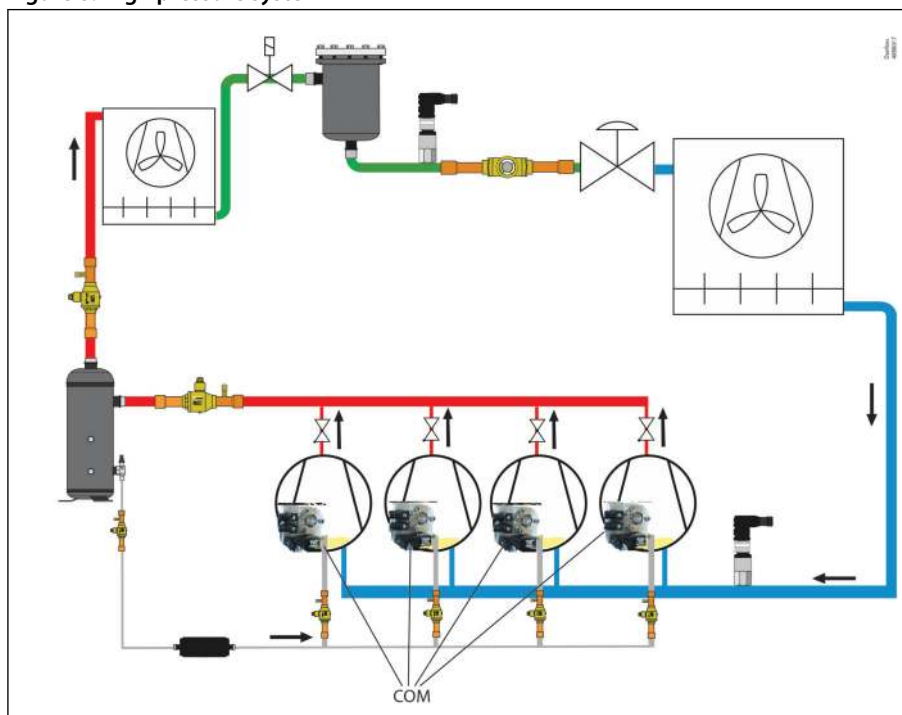
Figure 7: Low pressure system



The above shown is an example of low-pressure Oil system using Danfoss oil management. For such systems with oil pressure of 60 bar we use the 60bar oil level regulator, COM 10C. Each compressor must be fitted with one COM 10C. As needed, the ORD differential pressure valve can also be added.

High pressure Oil system

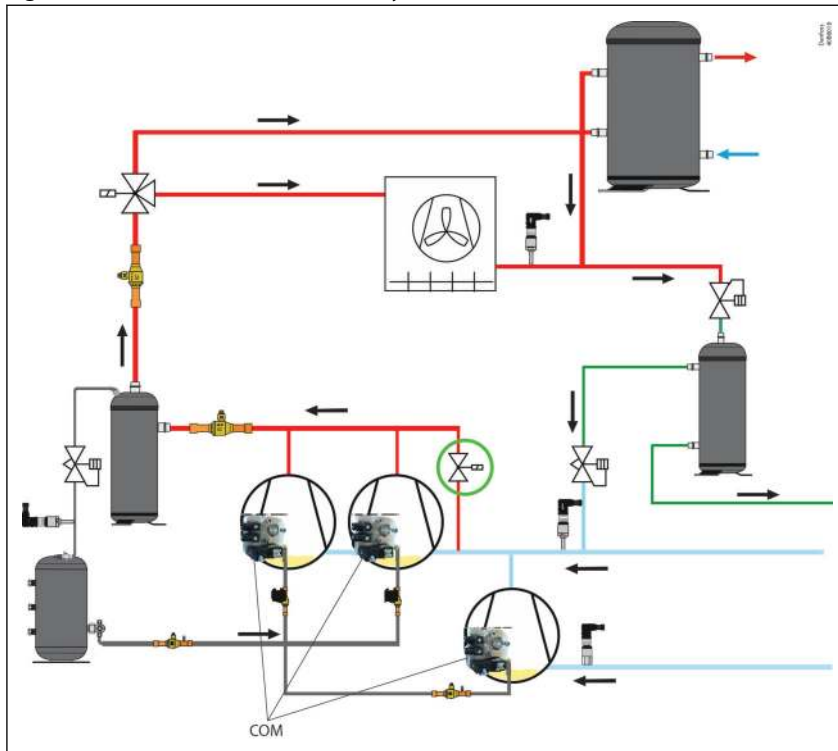
Figure 8: High pressure system



The above shown is an example of High-pressure Oil system using Danfoss oil Management. According to the pressure 60 bar or 130 bar in oil system, we can use COM 10C or COM 20 C respectively.

CO2 Booster/Trans-critical system

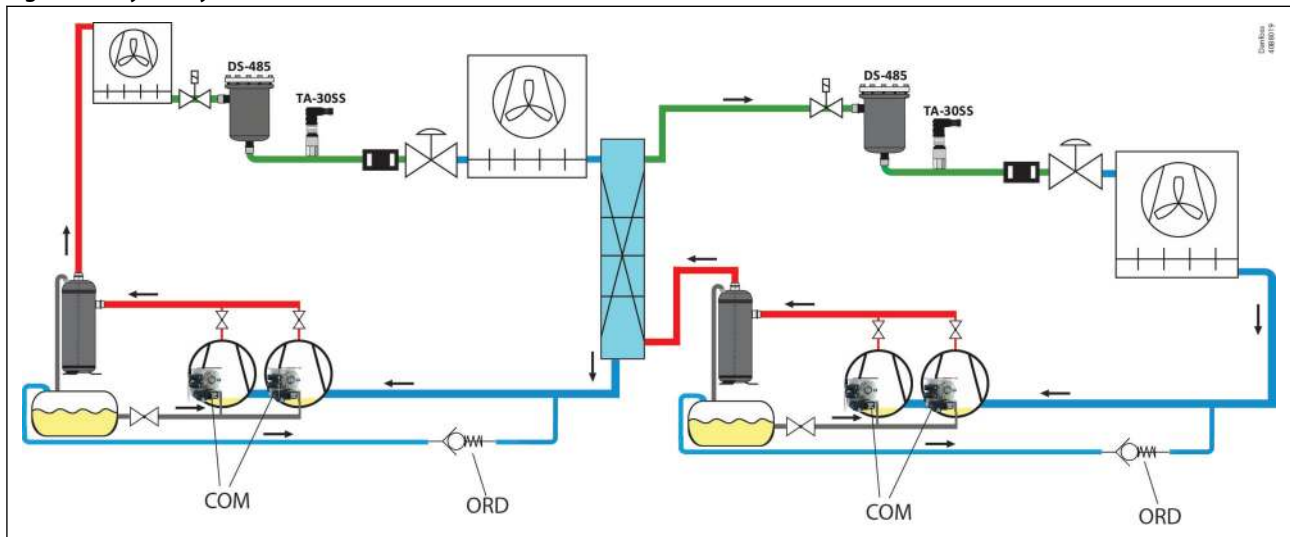
Figure 9: CO2 Booster / Trans-critical system



The above shown is an example of CO2 booster or trans-critical system using Danfoss oil Management.

Hybrid system with R134a and CO2

Figure 10: Hybrid system with R134a and CO2



The above shown is an example of hybrid system with R134a and CO2 using Danfoss oil Management.

Media

- Compatible Refrigerants: R404A, R134A, R448A, R449A, R450A, R513A, R744, R1234ze(E), R1234yf, R32, R455A, R454C, R1270, R290
- Compatible Oil: Mineral, Synthetic, Ester Oils

Product specification

Technical data

Table 1: Technical data

Model	COM 10C	COM 20C
Max Operating pressure	60 bar / 870 psi	130 bar / 1885 psi
Test Pressure	66 bar / 957 psi	143 bar / 2074 psi
Burst Pressure	180 bar / 2610 psi	390 bar / 5656 psi
Maximum Differential Pressure	40 bar / 580 psi	80 bar / 1160 psi (100 bar at nominal voltage)
Supply Voltage	24V AC 50Hz +10/-15%, 0,4A 230V AC 50Hz +10/-15% 0,04A	24V AC 50Hz +10/-15%, 0,4A 230V AC 50Hz +10/-15% 0,04A
Alarm contact	Max 3A,230V AC dry contact	Max 3A,230V AC dry contact
Protection class	IP65	IP65
Filter	100 micron mesh 80	100 micron mesh 80
Vibration resistance (EN 60068-2-6)	max. 4g, 10... 250Hz	max. 4g, 10... 250Hz

Table 2: Technical data

Model	Adaptor set
Max Operating pressure	60 bar / 870 psi
Test Pressure	66 bar / 957 psi
Burst Pressure	180 bar / 2610 psi
Vibration resistance (EN 60068-2-6)	max. 4g, 10... 250Hz

Table 3: Technical data

Model	ORD
Max Working Pressure	60 bar / 870 psi
Test Pressure	86 bar / 1247 psi
Minimum Burst Pressure	300 bar / 4351 psi

Identification

The below images are examples of labels on the product.



Materials

Table 4: Materials

COM 10C/20C	Material details
Housing and adaptor	EN AW 6081, 6082
Oil connector	Brass CW 617N 7/16"-20 UNF male
Sight glass	11SMnPb37 Ni plated Pb< 0,035%
Screws	Stainless steel
Valve seat	PTFE
O ring	CR
Plastic coil of electrical cables	PBT UL system

Table 5: Materials

Adaptor	Material details
Plastic coil of electrical cables	EN AW 6081, 6082

Table 6: Materials

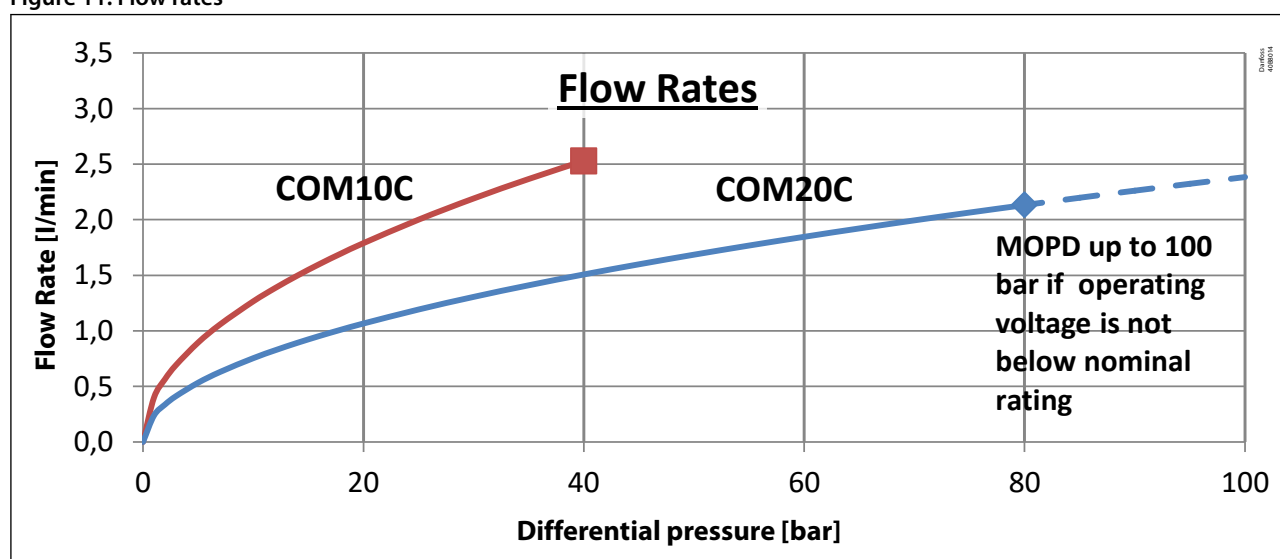
ORD	Material details
Housing	EN AW 6082,6026
Seat seal	PTFE
External sealing	O-Ring CR557-70

Table 7: Materials

Cables	Material details
Plastic coil of electrical cables	PBT UL system

Capacity tables

Figure 11: Flow rates



Performance and environment conditions

Table 8: Performance and environment conditions

Model	COM 10C	COM 20C
Media Temperature range	-40 to +80°C / -40 to +176°F	-40°C to +80°C / -40 to +176°F
Ambient/Storage Temperature range	-40 to +50°C / -40 to +122°F (static)	-40 to +50°C / -40 to +122°F (static)
Humidity	0-80% RH (non-condensing)	0-80% RH (non-condensing)

Table 9: Performance and environment conditions

Model	Adaptors
Media Temperature range	-40 to +80°C / -40 to +176°F
Ambient/Storage Temperature range	-40 to +50°C / -40 to +122°F (static)
Humidity	0-80% RH (non-condensing) (up to 100% for T versions)

Table 10: Performance and environment conditions

Model	ORD
Media Temperature range	-40 to +80°C / -40 to +176°F
Ambient/Storage Temperature range	-40 to +135°C / -40 to +275°F

Table 11: Performance and environment conditions

Model	Cables
Media Temperature range	-40 to +80°C / -40 to +176°F
Ambient/Storage Temperature range	-40 to +50°C / -40 to +122°F (static)
Humidity	0-80% RH (non-condensing)

Dimensions and weights

Table 12: Dimensions and weights

Code no.	Type	Net Weight(Kg)
040B0119	COM 10C Oil level regulator	0,580
040B0120	COM 10C Oil level regulator	0,575
040B0121	COM 20C Oil level regulator	0,635
040B0122	COM 20C Oil level regulator	0,630
040B0100	COM 20C Oil level regulator	0,635

Table 13: Dimensions and weights

Code no.	Type	Net Weight(Kg)
040B0163	ORD Differential pressure valve 1,5 bar	0,045
040B0164	ORD Differential pressure valve 3,5 bar	0,045
040B0165	ORD Differential pressure valve 5,0 bar	0,045

Table 14: Dimensions and weights

Code no.	Type	Depth	Net Weight(Kg)
040B0123	Adaptor set COM-AD-000	40,0 mm	0,120
040B0124	Adaptor set COM-AD-034-14	30,0 mm	0,060
040B0125	Adaptor set COM-AD-114	36,0 mm	0,100
040B0126	Adaptor set COM-AD-134	40,0 mm	0,130
040B0127	Adaptor set COM-AD-D06	40,0 mm	0,120
040B0128	Adaptor set COM-AD-118-18	22,5 mm	0,075
040B0129	Adaptor set COM-AD-118-18L	42,5 mm	0,100
040B0130	Mounting Adaptor set COM-AD-118-18	22,5 mm	0,080
040B0131	Mounting Adaptor set COM-AD-118-18	22,5 mm	0,076
040B0145	Adaptor set COM-AD-241	45,0 mm	0,106
040B0146	Adaptor set COM-AD-214	54,0 mm	0,345

Table 15: Dimensions and weights

Code no.	Type	Length	Net Weight(Kg)
040B0153	Power Cable set for Power 10 m	10,00 m	0,436
040B0155	Power Cable set for Power 15 m	15,00 m	0,672
040B0157	Power Cable set for Power 20 m	20,00 m	0,880
040B0147	Power Cable set for Power 3 m	3,00 m	0,154
040B0151	Power Cable set for Power 5 m	5,00 m	0,255
040B0149	Power Cable set for Power 6 m	6,00 m	0,272
040B0101	Power Cable set 5 m for Power	5,00 m	0,255
040B0102	Power Cable set 10 m for Power	10,00 m	0,436
040B0103	Power Cable set 15 m for Power	15,00 m	0,672
040B0104	Power Cable set 20 m for Power	20,00 m	0,880

Table 16: Dimensions and weights

Code no.	Type	Length	Net Weight(Kg)
040B0148	Relay Cable set for Relays 3 m	3,00 m	0,123 KG
040B0152	Relay Cable set for Relays 5 m	5,00 m	0,197 KG
040B0150	Relay Cable set for Relays 6 m	6,00 m	0,224 KG
040B0154	Relay Cable set for Relays 10 m	10,00 m	0,386 KG
040B0156	Relay Cable set for Relays 15 m	15,00 m	0,583 KG
040B0158	Relay Cable set for Relays 20 m	20,00 m	0,767 KG
040B0111	Relay Cable set 5 m for Relay	5,00 m	0,197 KG
040B0112	Relay Cable set 10 m for Relay	10,00 m	0,386 KG
040B0113	Relay Cable set 15 m for Relay	15,00 m	0,583 KG
040B0114	Relay Cable set 20 m for Relay	20,00 m	0,767 KG

Figure 12: ORD dimensions

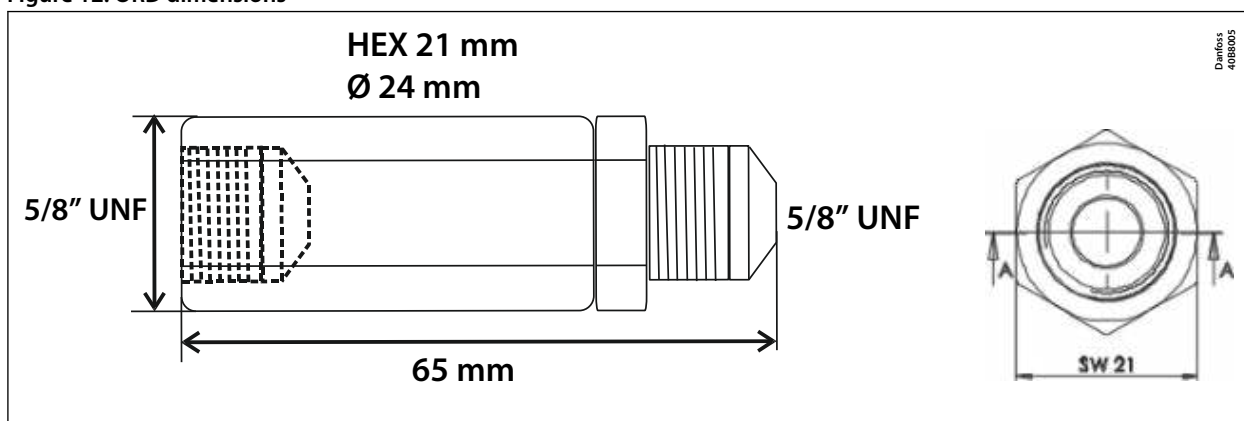


Figure 13: COM dimensions

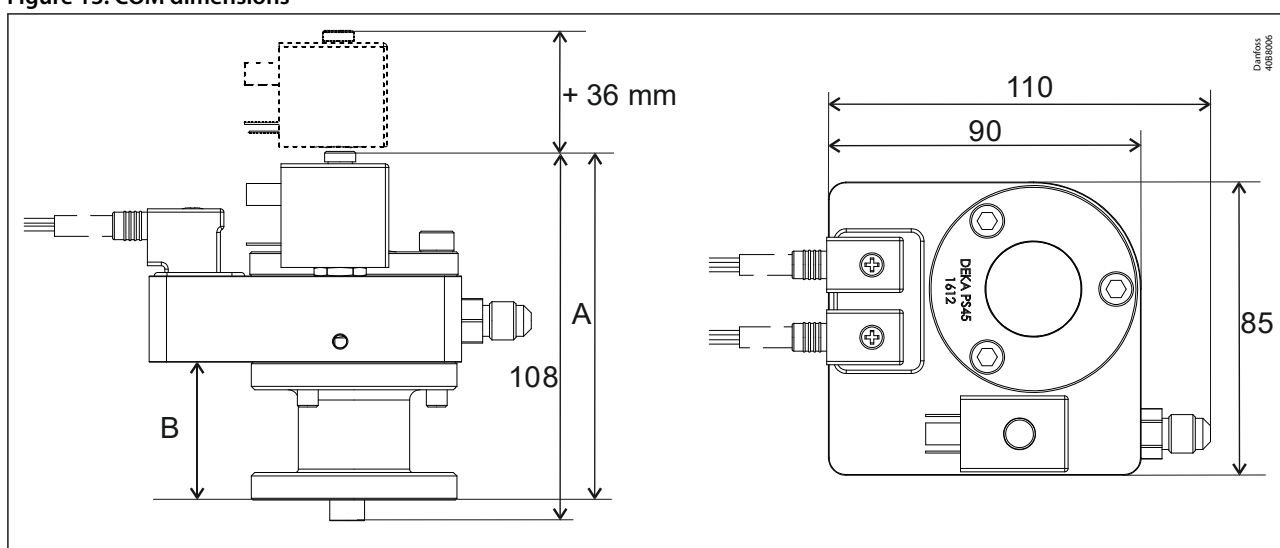


Table 17: COM dimensions

Type	A(mm) installed	B (Adaptor depth)
Adaptor set COM-AD-000	101,0 mm	40,0 mm
Adaptor set COM-AD-034-14	91,0 mm	30,0 mm
Adaptor set COM-AD-114	97,0 mm	36,0 mm
Adaptor set COM-AD-134	101,0 mm	40,0 mm
Adaptor set COM-AD-D06	101,0 mm	40,0 mm
Adaptor set COM-AD-118-18	22,5 mm	22,5 mm
Adaptor set COM-AD-118-18L	83,5 mm	42,5 mm
Mounting Adaptor set COM-AD-118-18	83,5 mm	22,5 mm
Mounting Adaptor set COM-AD-118-18	83,5 mm	22,5 mm
Adaptor set COM-AD-241	106,0 mm	45,0 mm
Adaptor set COM-AD-214	115,0 mm	54,0 mm

Selection

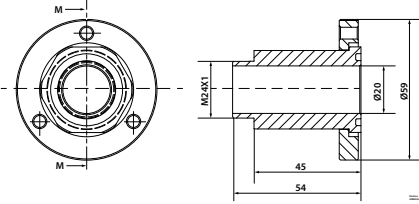
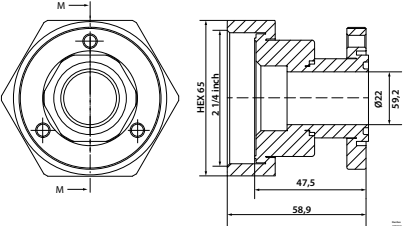
Table 18: selection of adaptor

Adaptor type	Dimension	Interface
Adapter COM-AD-000		Mounting Adapter 3-4 hole for compressor or vessel
Adapter COM-AD-118-18		Adapter 1-1/8"-18 UNEF for compressor or vessel
Adapter COM-AD-118-18L		Adapter 1-1/8"-18 UNEF Long for compressor or vessel
COM-AD-000		Mounting Adapter 3-4 hole for compressor or vessel
COM-AD-034-14		Mounting adaptor set for compressor or vessel 3/4"-14 NPT
COM-AD-114		Mounting adaptor set for compressor or vessel Rota-lock 1-1/4"

Oil level Regulators, COM

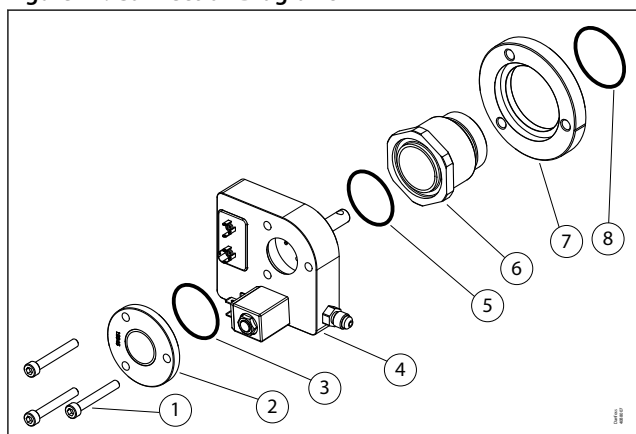
Adapter type	Dimension	Interface
COM-AD-134		Mounting adaptor set for compressor or vessel Rota-lock 1-3/4"
COM-AD-D06		Mounting adaptor set for compressor or vessel 6 hole
COM-AD-118-18		Mounting adaptor set for compressor or vessel 1-1/8"-18 UNEF
COM-AD-118-18L		Mounting adaptor set for compressor or vessel 1-1/8"-18 UNEF
COM-AD-118-18 (Danfoss - mit zusätzlichem Adapter-Ring)		Mounting adaptor set for compressor or vessel 1-1/8"-18 UNEF With additional adapter ring

Oil level Regulators, COM

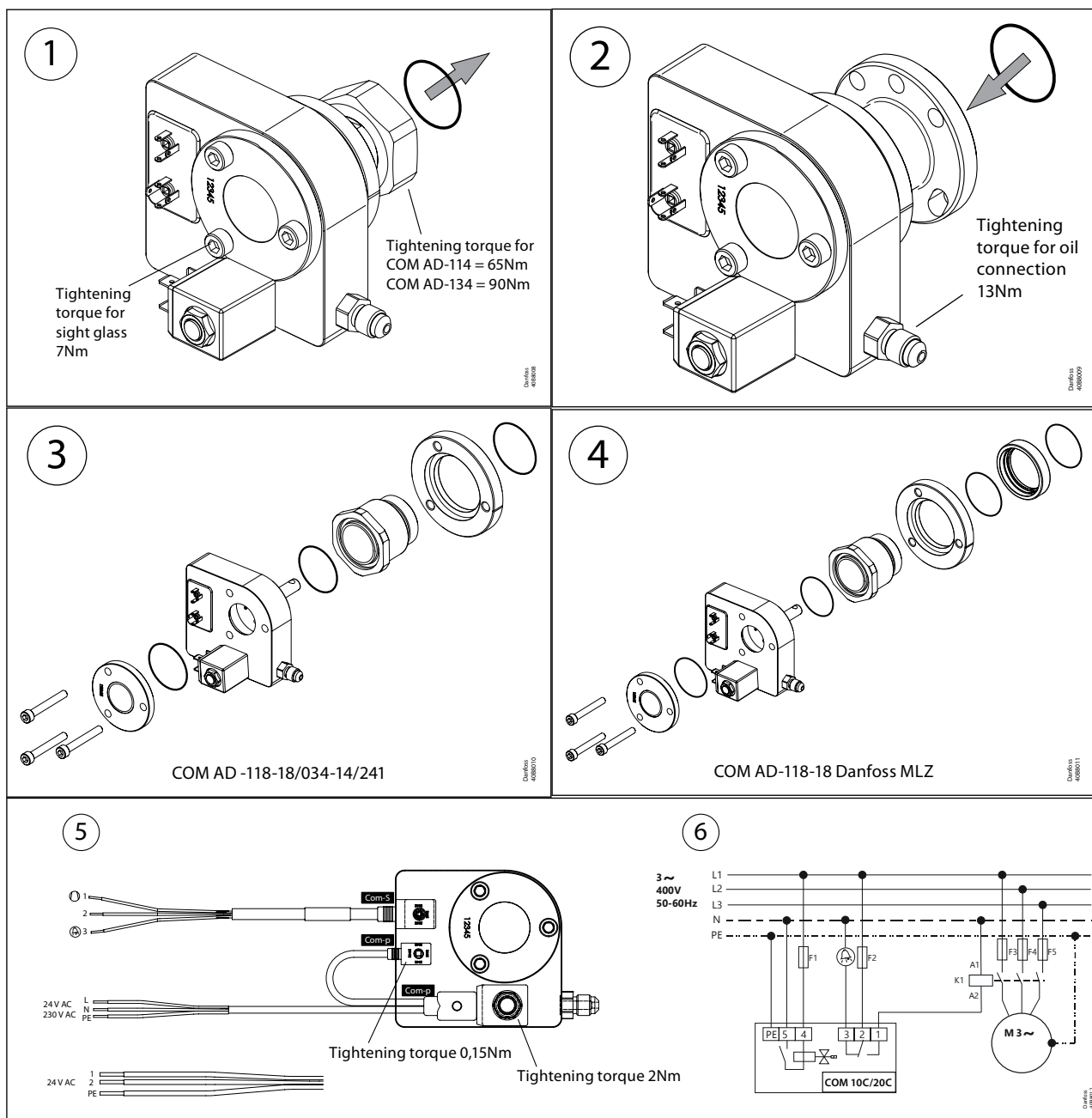
Adapter type	Dimension	Interface
COM-AD-118-18 (Dorin - mit zusätzlichem Alu Dichtring)	Identical to 040B0106 + Aluminum gasket Dimension of alu gasket: 28,7 x 34 x 2. (mm)	Mounting adaptor set for compressor or vessel 1-1/8"-18 UNEF With additional alu gasket
COM-AD-241		Mounting adaptor set for compressor or vessel M24x1
COM-AD-214		Mounting adaptor set for compressor or vessel Rota-lock 2-1/4"

Connection Diagrams

Figure 14: Connection Diagrams



- | | |
|---|---------------|
| 1 | Screw (3pcs.) |
| 2 | Sight glass |
| 3 | O-ring |
| 4 | Body |
| 5 | O-ring |
| 6 | Adapter |
| 7 | Flange ring |
| 8 | O-ring |

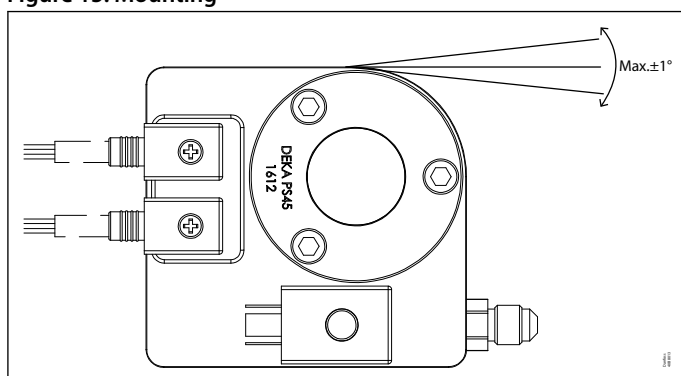


See product installation guide for more details.

Mounting

Align the product horizontally (tol. +/- 1°).

Figure 15: Mounting



Ordering

Product part numbers

Table 19: COM Base Unit

Description	Supply Voltage	Packaging Format	Quantity per packaging	Code No.
COM 10C Oil level regulator	230V	Single pack	1	040B0119
COM 10C Oil level regulator	24V	Single pack	1	040B0120
COM 20C Oil level regulator	230V	Single pack	1	040B0121
COM 20C Oil level regulator	24V	Single pack	1	040B0122
COM 20C Oil level regulator	230V	Industrial pack	6	040B0100

Table 20: ORD Differential Pressure Valve

Description	Inlet Connection Type	Outlet Connection Type	Packaging Format	Quantity per packaging	Code No.
ORD Differential pressure valve 1,5 bar	5/8-18-2B" UNF	5/8-18-2A" UNF	Single pack	1	040B0163
ORD Differential pressure valve 3,5 bar	5/8-18-2B" UNF	5/8-18-2A" UNF	Single pack	1	040B0164
ORD Differential pressure valve 5,0 bar	5/8-18-2B" UNF	5/8-18-2A" UNF	Single pack	1	040B0165

Accessories part numbers

Table 21: Adaptor

Description	Connection Type	Connection Length	Packaging Format	Quantity per packaging	Code No.
Adaptor set COM-AD-000	Flange	40,0 mm	Single pack	1	040B0123
Adaptor set COM-AD-034-14	3/4 - 14" NPT	30,0 mm	Single pack	1	040B0124
Adaptor set COM-AD-114	1 1/4-12-2B UNF	36,0 mm	Single pack	1	040B0125
Adaptor set COM-AD-134	1 3/4-12-2B UNF	40,0 mm	Single pack	1	040B0126
Adaptor set COM-AD-D06	Flange	40,0 mm	Single pack	1	040B0127
Adaptor set COM-AD-118-18	1 1/8" UNEF	22,5 mm	Single pack	1	040B0128
Adaptor set COM-AD-118-18L	1 1/8" UNEF	42,5 mm	Single pack	1	040B0129
Mounting Adaptor set COM-AD-118-18	1 1/8" UNEF	22,5 mm	Single pack	1	040B0130
Mounting Adaptor set COM-AD-118-18	1 1/8" UNEF	22,5 mm	Single pack	1	040B0131
Adaptor set COM-AD-241	M 24mm	45,0 mm	Single pack	1	040B0145
Adaptor set COM-AD-214	2 1/4-12-2B UNF	54,0 mm	Single pack	1	040B0146

Table 22: Power cable

Description	Voltage	Length	Type	Packaging Format	Quantity per packaging	Code No.
Power Cable set for Power 10 m	24 V	10,00 m	DIN 43650	Single pack	1	040B0153
Power Cable set for Power 15 m	24 V	15,00 m	DIN 43650	Single pack	1	040B0155
Power Cable set for Power 20 m	24 V	20,00 m	DIN 43650	Single pack	1	040B0157
Power Cable set for Power 3 m	24 V	3,00 m	DIN 43650	Single pack	1	040B0147
Power Cable set for Power 5 m	24 V	5,00 m	DIN 43650	Single pack	1	040B0151
Power Cable set for Power 6 m	24 V	6,00 m	DIN 43650	Single pack	1	040B0149
Power Cable set 5 m for Power	24 V	5,00 m	DIN 43650	Industrial pack	50	040B0101

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Description	Voltage	Length	Type	Packaging Format	Quantity per packaging	Code No.
Power Cable set 10 m for Power	24 V	10,00 m	DIN 43650	Industrial pack	35	040B0102
Power Cable set 15 m for Power	24 V	15,00 m	DIN 43650	Industrial pack	25	040B0103
Power Cable set 20 m for Power	24 V	20,00 m	DIN 43650	Industrial pack	20	040B0104

Table 23: Relay cable

Description	Voltage	Current	Length	Type	Packaging Format	Quantity per packaging	Code No.
Relay Cable set for Relays 3 m	230 V	3,0 A	3,00 m	DIN 43650	Single pack	1	040B0148
Relay Cable set for Relays 5 m	230 V	3,0 A	5,00 m	DIN 43650	Single pack	1	040B0152
Relay Cable set for Relays 6 m	230 V	3,0 A	6,00 m	DIN 43650	Single pack	1	040B0150
Relay Cable set for Relays 10 m	230 V	3,0 A	10,00 m	DIN 43650	Single pack	1	040B0154
Relay Cable set for Relays 15 m	230 V	3,0 A	15,00 m	DIN 43650	Single pack	1	040B0156
Relay Cable set for Relays 20 m	230 V	3,0 A	20,00 m	DIN 43650	Single pack	1	040B0158
Relay Cable set 5 m for Relay	230 V	3,0 A	5,00 m	DIN 43650	Industrial pack	50	040B0111
Relay Cable set 10 m for Relay	230 V	3,0 A	10,00 m	DIN 43650	Industrial pack	35	040B0112
Relay Cable set 15 m for Relay	230 V	3,0 A	15,00 m	DIN 43650	Industrial pack	25	040B0113
Relay Cable set 20 m for Relay	230 V	3,0 A	20,00 m	DIN 43650	Industrial pack	20	040B0114

Spare part numbers

Table 24: Spare part numbers

Description	Packaging Format	Quantity per packaging	Code No.
Spare part set COM10C	Single pack	1	040B0159
Spare part set COM20C	Single pack	1	040B0160
Spare part 24V Coil	Single pack	1	040B0161
Spare part 23V Coil	Single pack	1	040B0162

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Valid approvals

Table 25: Valid approvals

		
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Online support

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