

## Data Sheet

# Optyma controller

## Type **AK-RC 204B, 205C, 305W-SD**

Food quality for walk-in coolers and freezers



The new AK-RC family is a complete refrigeration controls range with great flexibility to adapt to cold storage rooms.

The full AK-RC family controls are designed to save installation time, reduce energy consumption and provide the best food quality preservation for cold room application.

**Features:**

- Ease of installation due to easy wiring and high environmental protection enclosure.
- Fast commissioning with startup wizard.
- Tiered platform with wide range of functionalities and logics to fit with extensive range of applications and to comply with food safety regulations.
- Advanced defrost logic to improve energy saving and performance.
- Magnetic thermal circuit protection included.
- Wide display, clear and intuitive menu for at-a-glance information.
- Integration into Danfoss ADAP-KOOL system over modbus for a full store management.
- Standard Modbus connectivity for 3<sup>rd</sup> party integration.
- Optional cloud and remote connectivity via ProsaLink app, IoT module and Cloud service.

## Portfolio overview

**Table 1: Portfolio overview**

Technical characteristics	AK-RC 204B	AK-RC 205C	AK-RC 305W-SD
Danfoss P/N	080Z5001	080Z5002	080Z5003
Power Supply	230 V AC I	230 V AC I	100 – 240 V AC I
Dimensions (WxHxD) mm	290x141x84,4	290x141x84,4	290x141x84,4
Sealing	IP65	IP65	IP65
Electrical Protection		Yes (16A)	
Digital outputs		1 SPDT 16A	1 SPDT 16A
	2 SPDT 20A	2 SPDT 20A	2 SPDT 20A
	2 SPST 16A	2 SPST 16A	2 SPST 16A
Analog inputs	2 NTC	2 NTC	2 NTC
Digital inputs	1	1	1
Wizard Menu	Yes	Yes	Yes
Temperature Control	Yes	Yes	Yes
Advanced defrost function			Yes
Modbus	Yes	Yes	Yes
Datalogger	Option with PR-SC4	Option with PR-SC4	Option with PR-SC4

## Functions

Optyma Control controls completely the cold room system:

- Compressor
- Crankcase resistor
- Evaporator fans
- Defrost resistance (up to 2 evaporators)
- Solenoid valve
- Cold room light
- Door frame and drain heaters
- Door control (activity and alarms)
- Remote Setpoint change and defrost
- Alarms
  - Temperature
  - Open door

Figure 1: Autonomous system

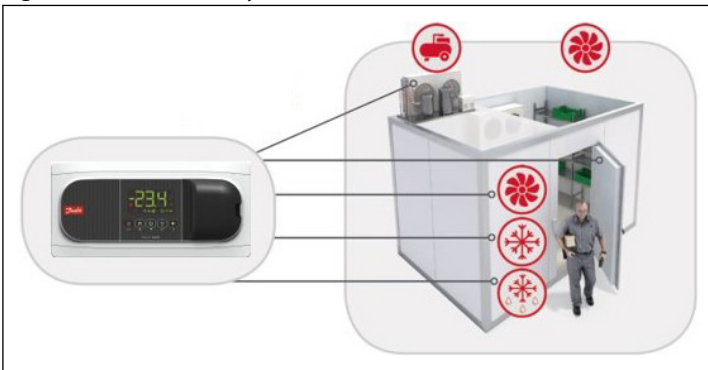
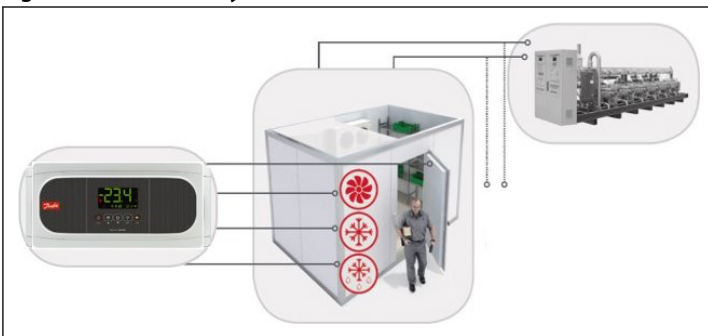


Figure 2: Distributed system



**AK-RC 305W** using Adaptive Defrost logic optimize the time that drain and tray resistors are working, significantly reducing the electrical consumption fan regulation to take advantage of thermal inertia (frost) of the evaporator, achieving:

- Less number of compressor activations
- Less energy consumption
- Less Mechanical Stress as a result of less compressor activations

Minimize number and duration of Defrost:

- Reduce Thermal Stress
- Increase time in set-point
- Reduce energy consumption
- Reduce risk of gas leakage

## Applications

- Easy and quick to mount
- Easy to wire
- Kitted with 2 NTC 10K sensors

Quick setup in few steps:

1. Wire controller
2. Apply power
3. Run the Wizard to select the correct application as per [Table 2: InI applications](#)
4. Configure the desired set-point

In the below table are listed all the available initial applications.

**Table 2: InI applications**

InI <sup>(1)</sup>	Type of installation			
	Cold regulation	Pump Down	Defrost	Evap.fans
<b>0</b>	Demo Mode: it displays the temperature but does not regulate the temperature or activate replays			
<b>1</b>	Solenoid	No	Electric	Yes
<b>2</b>	Solenoid + compressor	Yes	Electric	Yes
<b>3</b>	Solenoid + compressor	No	Electric	Yes
<b>4</b>	Solenoid	No	Air	Yes
<b>5</b>	Solenoid + compressor	Yes	Air	Yes
<b>6</b>	Solenoid + compressor	No	Air	Yes
<b>7</b>	Solenoid + compressor	Yes	Hot gas	Yes
<b>8</b>	Solenoid + compressor	No	Hot gas	Yes
<b>9<sup>(2)</sup></b>	Solenoid + compressor	Yes	Reversed cycle	Yes
<b>10<sup>(2)</sup></b>	Solenoid + compressor	No	Reversed cycle	Yes
<b>11<sup>(2)</sup></b>	Solenoid	No	Static	No
<b>12<sup>(2)</sup></b>	Solenoid + compressor	Yes	Static	No
<b>13<sup>(2)</sup></b>	Solenoid + compressor	No	Static	No

<sup>(1)</sup> See [Connection diagrams](#)

<sup>(2)</sup> Not in 305W-SD.

## Connection diagrams

Compressor	4-way inverter valve
Crankcase resistor	Auxiliary relay 1
Fan	Auxiliary relay 2
Defrost resistor	High-low pressure controller
Solenoid	High pressure controller
Hot gas-valve	Low pressure controller
Condenser solenoid for hot gas	

AK-RC 204B

Figure 3: InI = 1, 4, 11

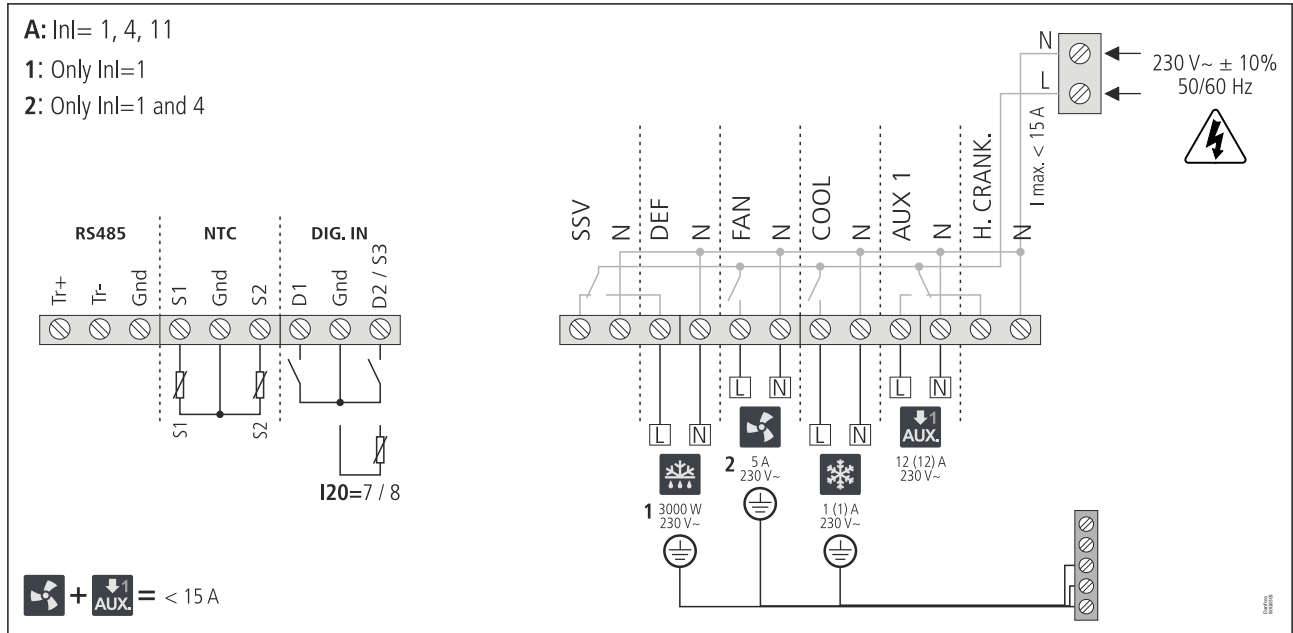


Figure 4: InI = 2, 3, 5, 6, 12, 13

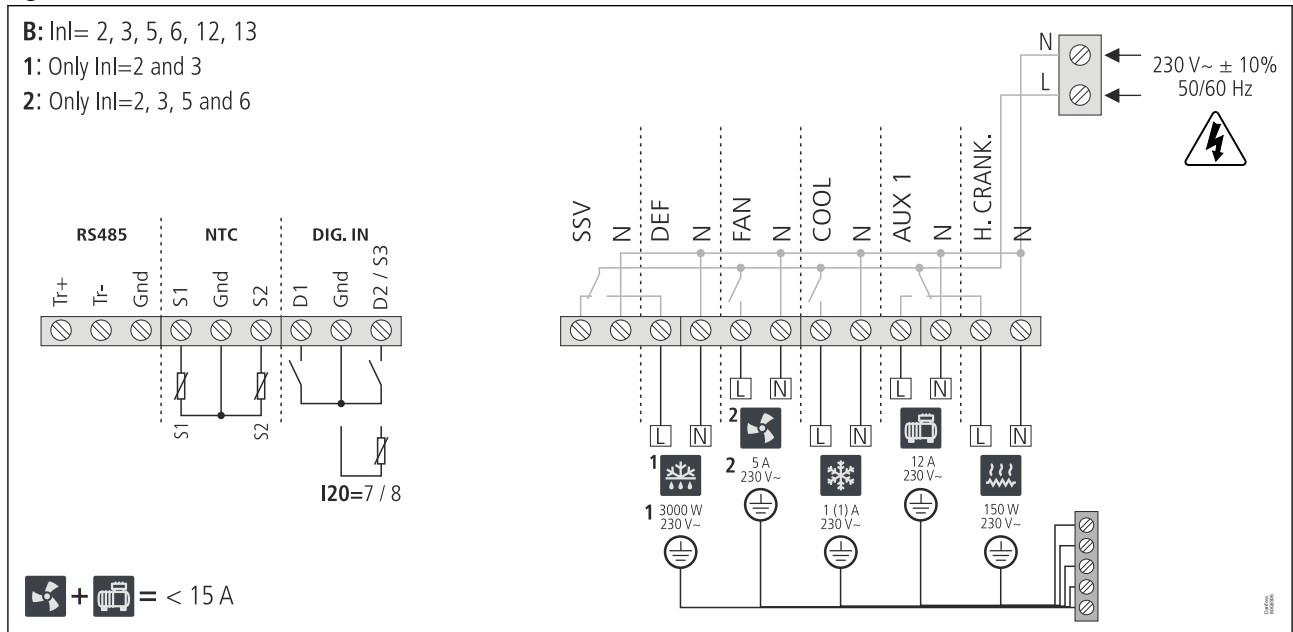


Figure 5: InI = 7, 8

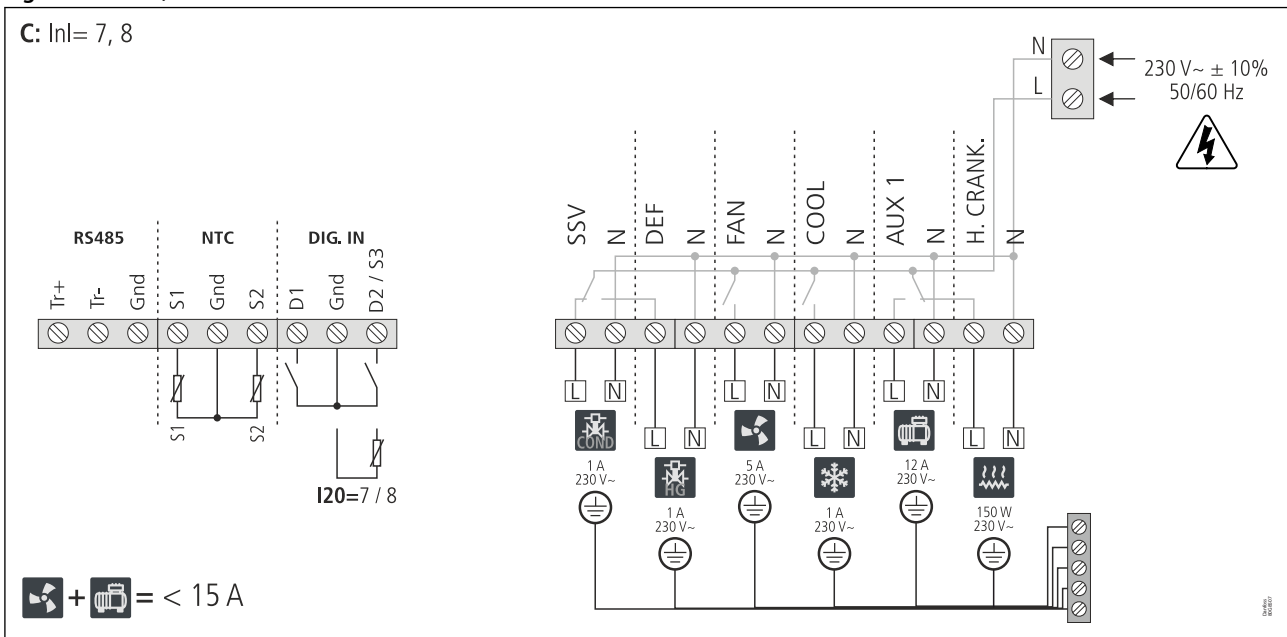
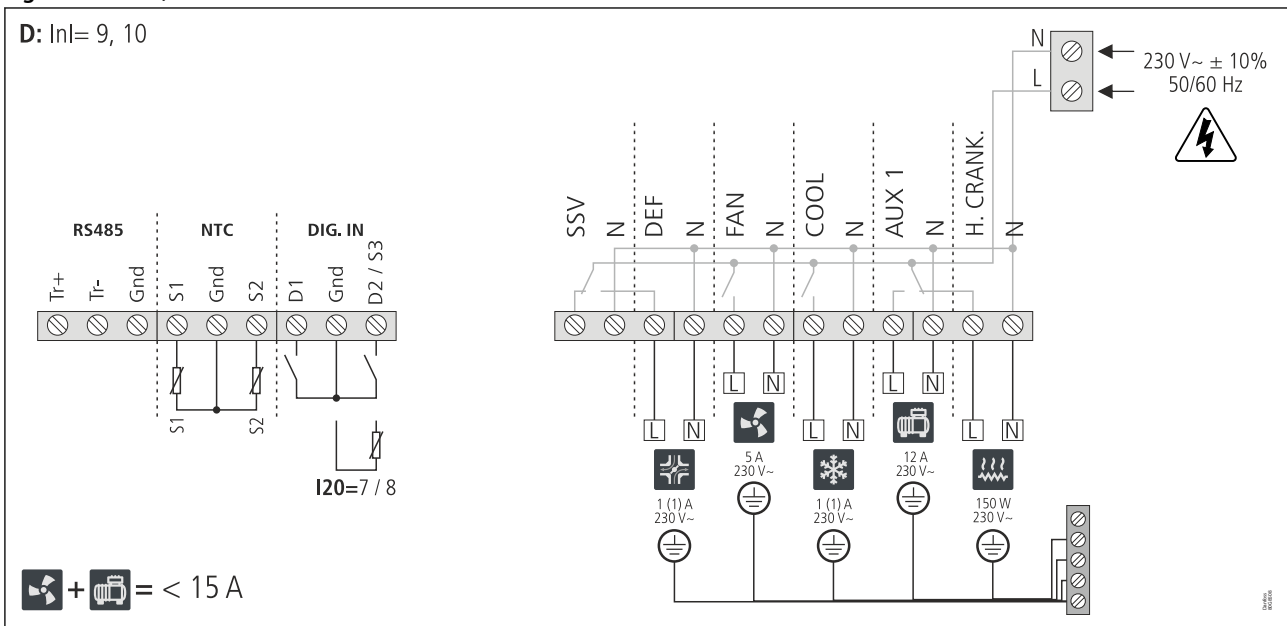


Figure 6: InI = 9, 10



AK-RC 205C

Figure 7: InI = 1, 4, 11

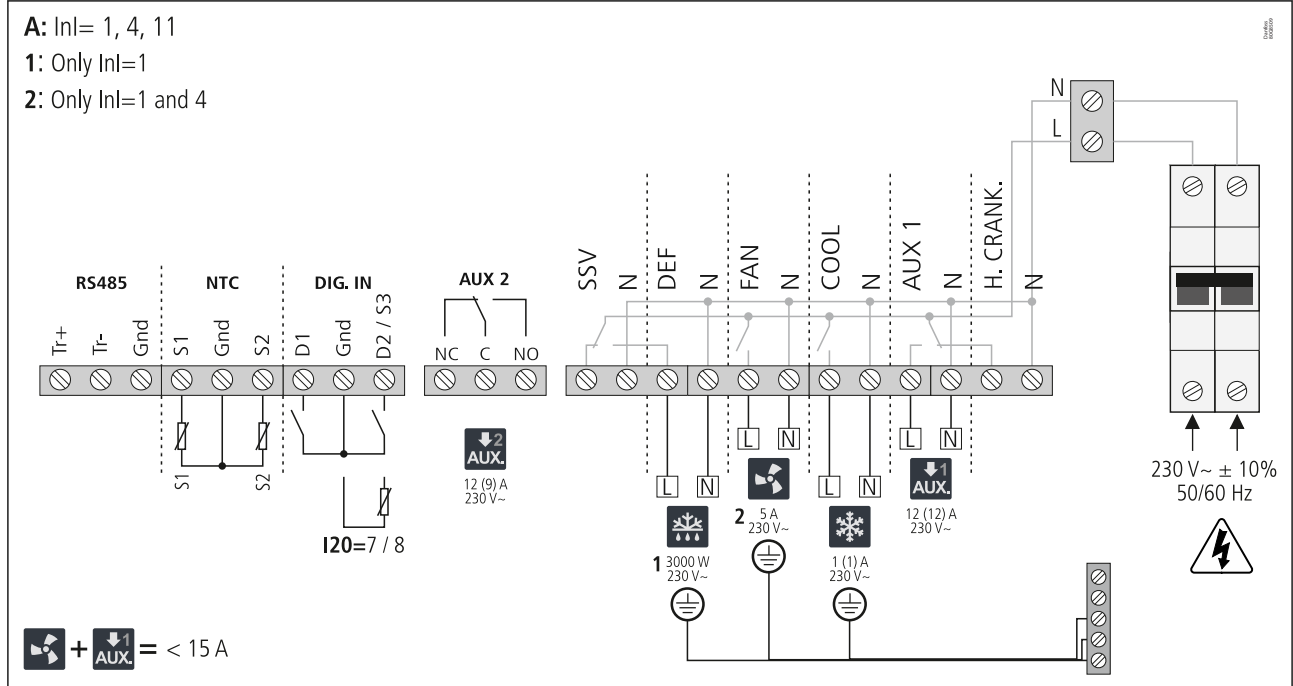


Figure 8: InI = 2, 3, 5, 6, 12, 13

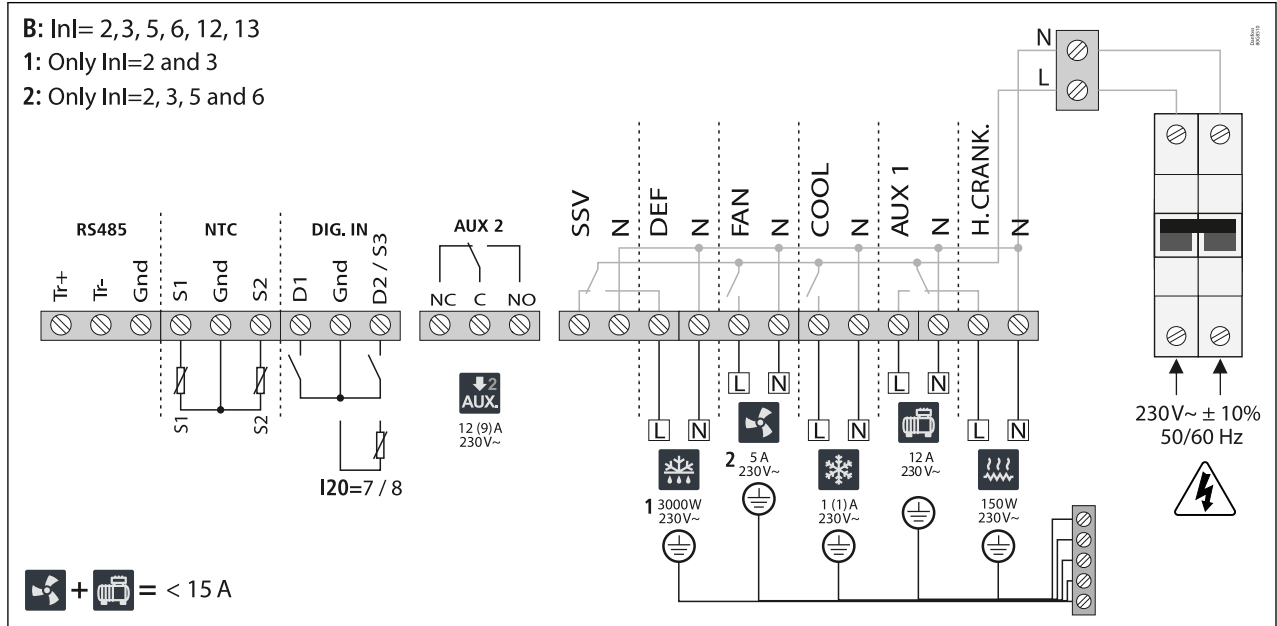


Figure 9: InI = 7, 8

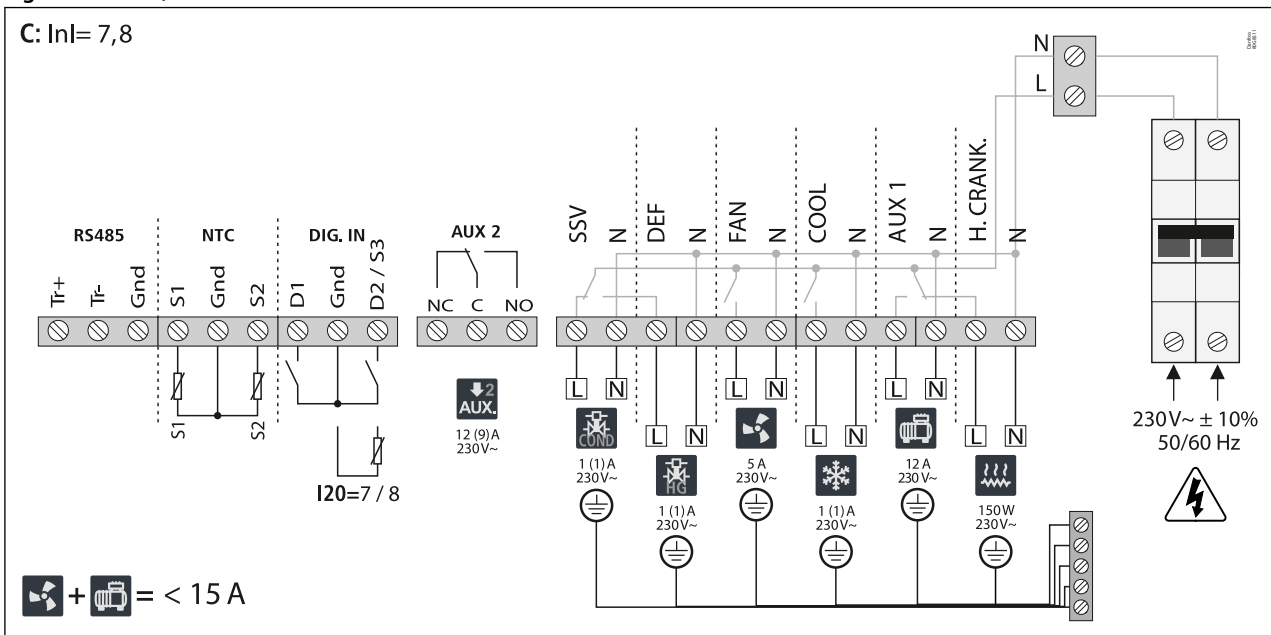
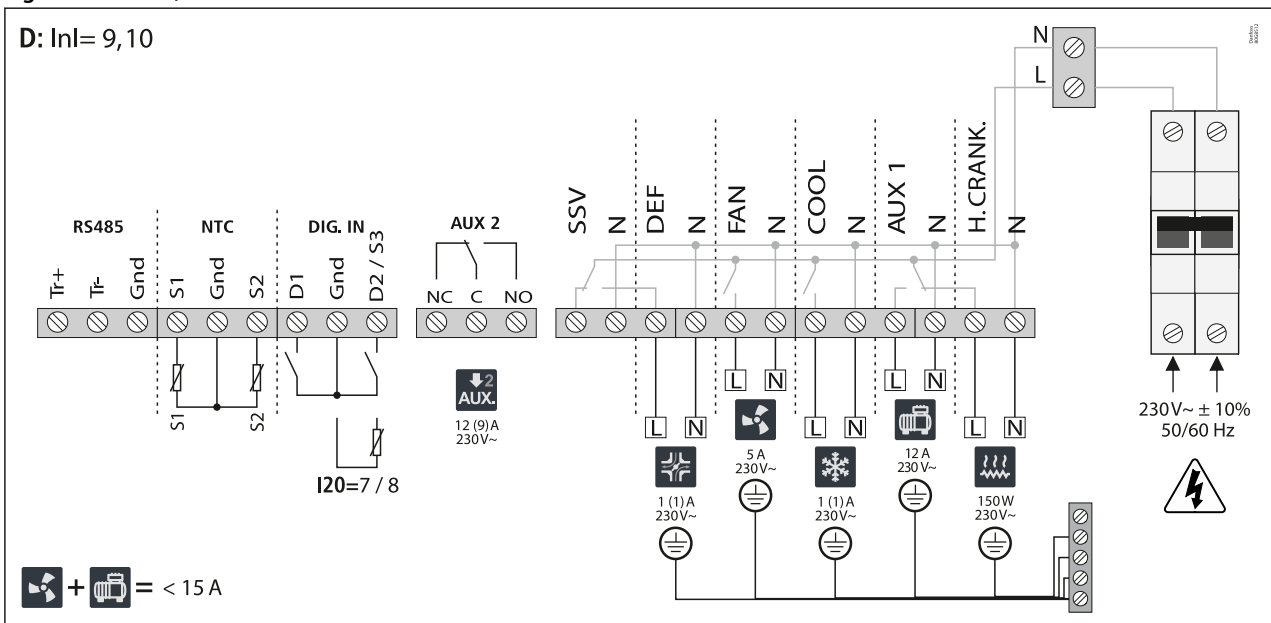


Figure 10: InI = 9, 10





AK-RC 305W

Figure 11: InI = 1, 4

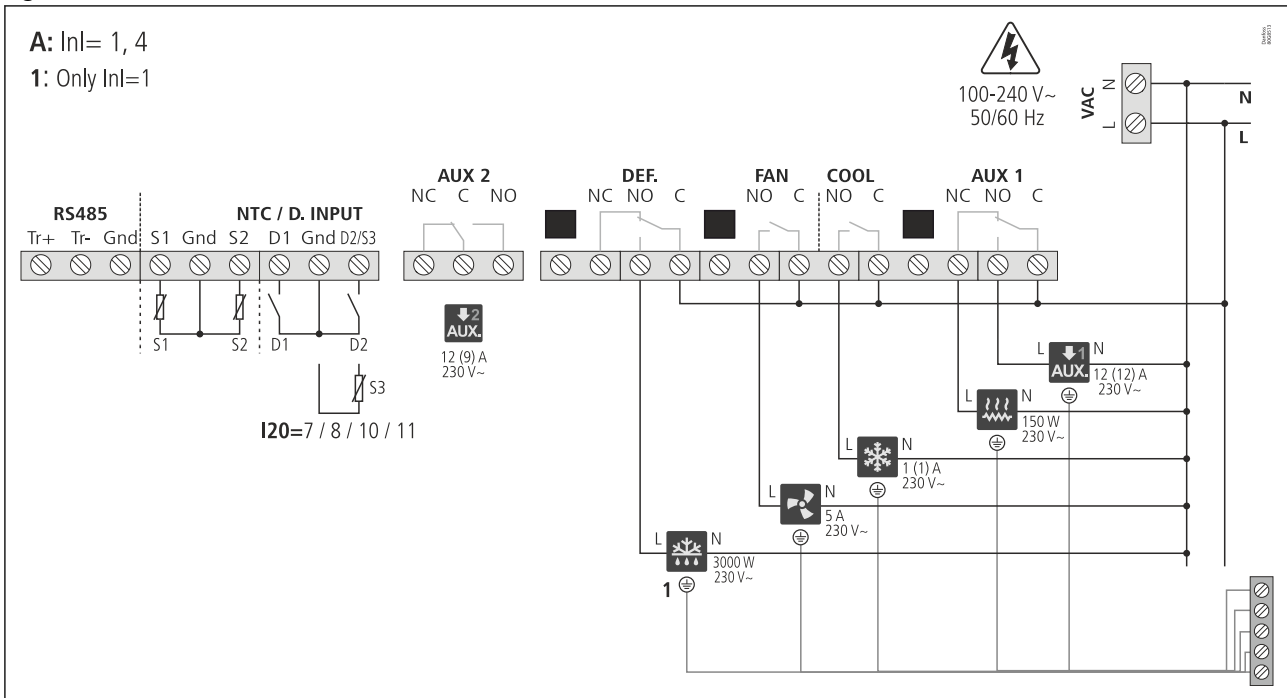


Figure 12: InI = 2, 3, 5, 6

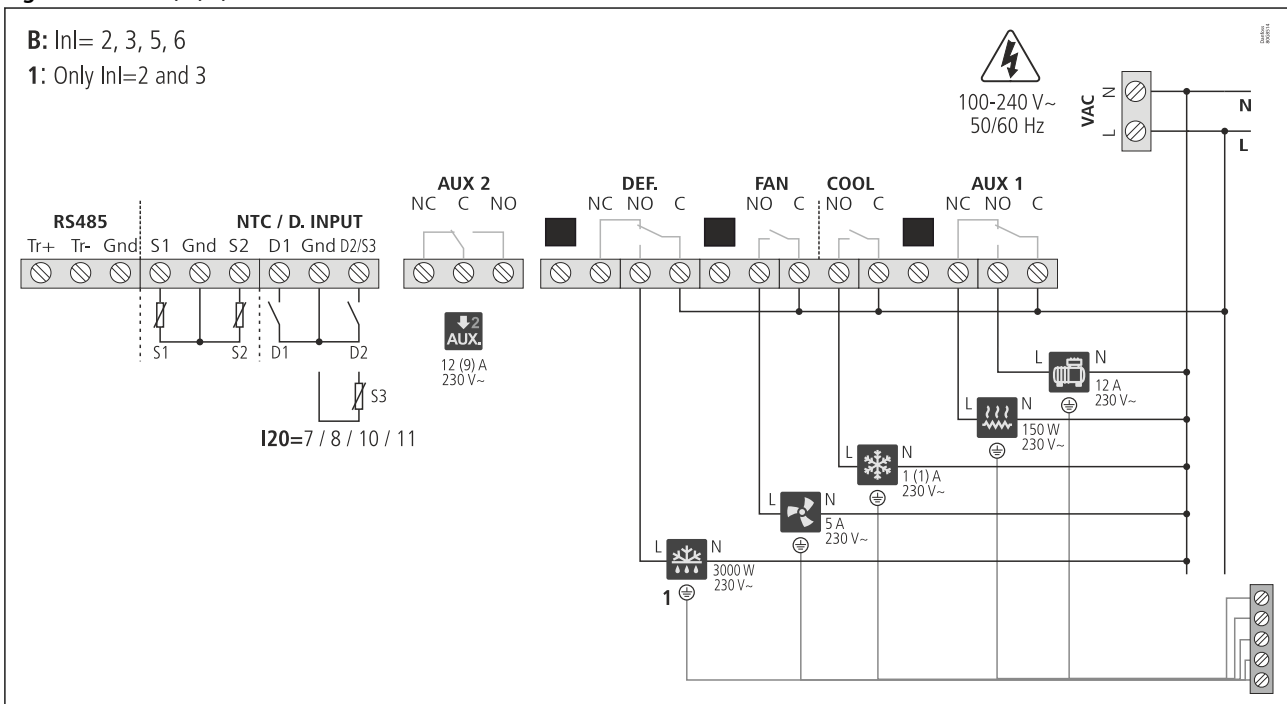


Figure 13: InI = 7, 8

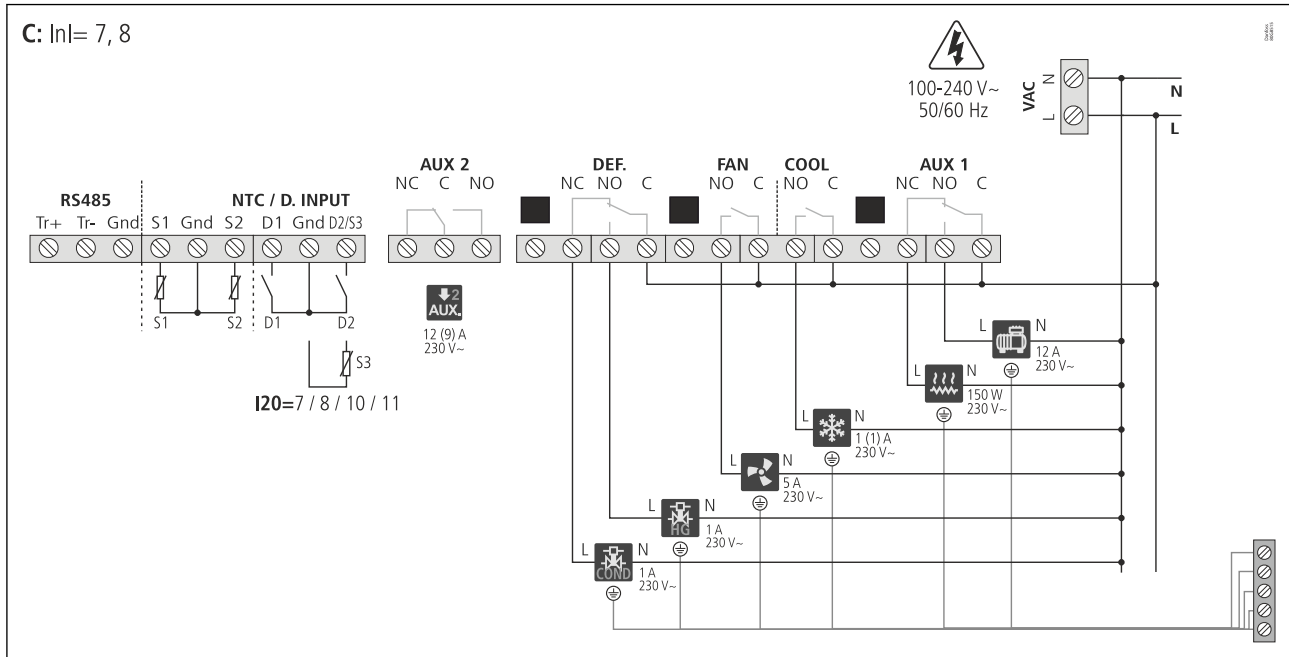
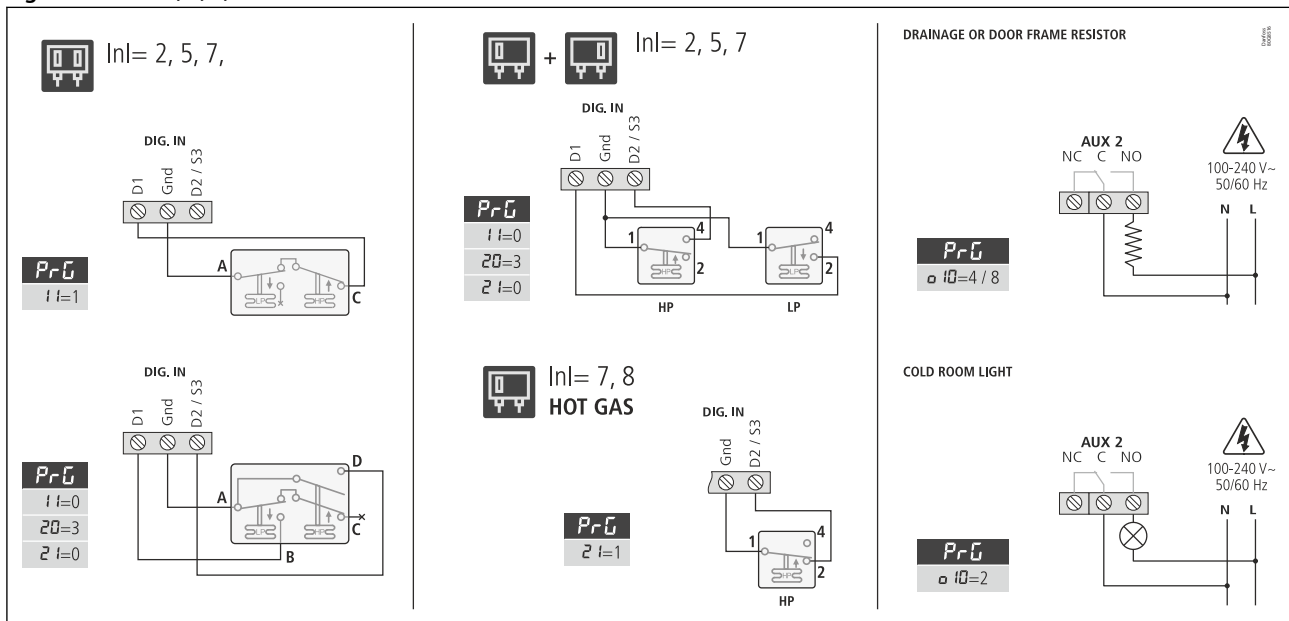


Figure 14: InI = 2, 5, 7, 8



## Cloud and remote connectivity with Danfoss Cloud Service

Danfoss Cold Room solution can easily be equipped with Danfoss IoT Cloud service to realize a “Connected Cold Room”. This enhancement will provide automatic alarms detection and dispatching via email plus the possibility to trace and log the main cold room regulation parameters for an data analysis (remote maintenance) or an on-demand HACCP report.

PR-SC4 is the IoT module that can be used to benefit of the cloud and remote connectivity together with the support of a dedicated smartphone app “ProsaLink”.

Figure 15: Danfoss cloud service



Following a schematic of the plug & play connection of the SC4 with AK-RC over Modbus RS485 port and the setting for the 2 parameters to enable the communication:

Figure 16:

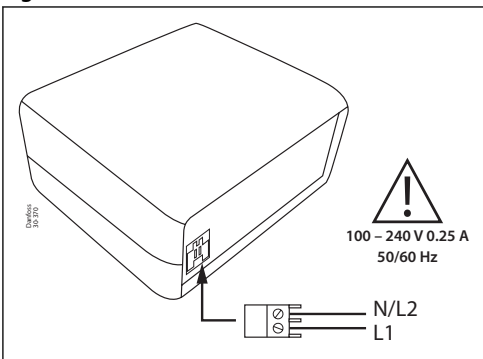


Figure 17:

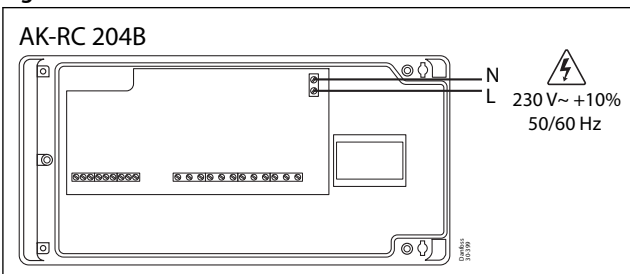


Figure 18:

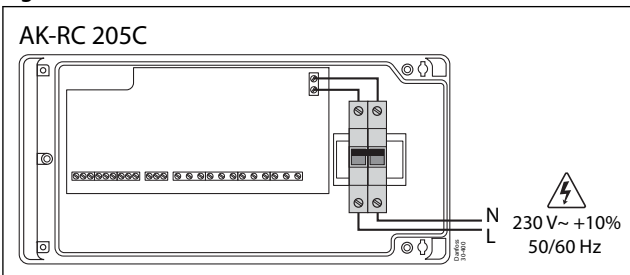
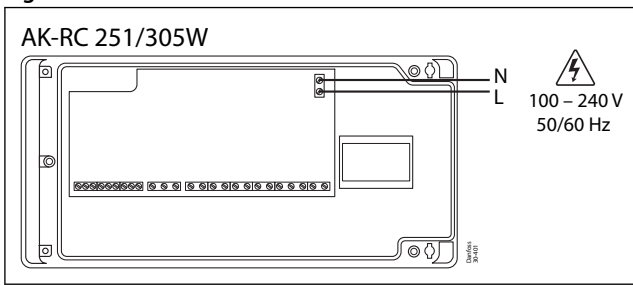


Figure 19:



Connect 3 wire Modbus from Optyma cold room control AK-RC 251, 204B, 205C, 305W to Prosa device.

Figure 20:

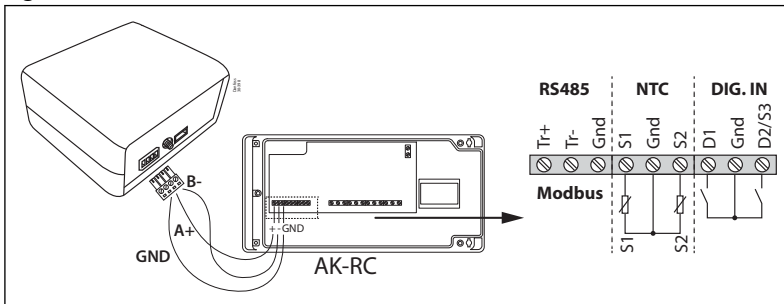


Figure 21:



Parameter "b20" "Modbus Address" = 1

Parameter "b21" "Communication speed" = 1 (19200 baudrate)

## Product specification

### Technical data

**Table 3: Technical data**

Features	Specifications	
Power supply	AK-RC 204B	230 V~ ± 10%, 50 Hz ± 5%
	AK-RC 205C	230 V~ ± 10%, 50 Hz ± 5%
	AK-RC 305W	100 - 240 V~ 50/60 Hz
Maximum input power in the operation		6.3 VA
Maximum nominal current		15 A
Relay SSV / DEFROST - SPDT - 20 A	NO	EN60730-1: 15 (15) A 250 V~
	NC	EN60730-1: 15 (13) A 250 V~
Relay FAN - SPST - 16 A		EN60730-1: 12 (9) A 250 V~
Relay COOL - SPST - 16 A		EN60730-1: 12 (9) A 250 V~
Relay AUX 1 - SPDT - 20 A	NO	EN60730-1: 15 (15) A 250 V~
	NC	EN60730-1: 15 (13) A 250 V~
Relay AUX 2 - SPDT - 16 A	NO	EN60730-1: 12 (9) A 250 V~
	NC	EN60730-1: 10 (8) A 250 V~
No. of relay operations		EN60730-1: 100.000 operations
Probe temperature range		from -50.0 to 99.9 °C
Resolution, setting and differential		0.1 °C
Thermometric precision		±1 °C
Loading tolerance of the NTC probe at 25 °C		±0.4 °C
Working ambient temperature	AK-RC 204B	from -10 to 50 °C
	AK-RC 205C	from -10 to 45 °C
	AK-RC 305W	from -10 to 50 °C
Storage ambient temperature		from -30 to +60 °C
Protection degree		IP65
Pollution degree		II s/ EN 60730-1
Control device classification		Built-in assembly, with Type 1.B automatic operation action feature, for use in clean situations, logical support (Software) class A and continuous operation. Degree of contamination 2 acc. to UNE-EN 60730-1. Double isolation between power supply, secondary circuit and relay output.
Temperature during ball-pressure test		Accessible parts: 75 °C
		Parts which position active elements: 125 °C
Current of radio jamming suppression tests		270 mA
Voltage and current as per EMC tests		207 V, 17 mA
Type of assembly		Fixed internal
Internal buzzer		Present

### Dimensions

**Figure 22: AK-RC 204B**


Figure 23: AK-RC 205C



Figure 24: AK-RC 305W



## Mounting

Figure 25:

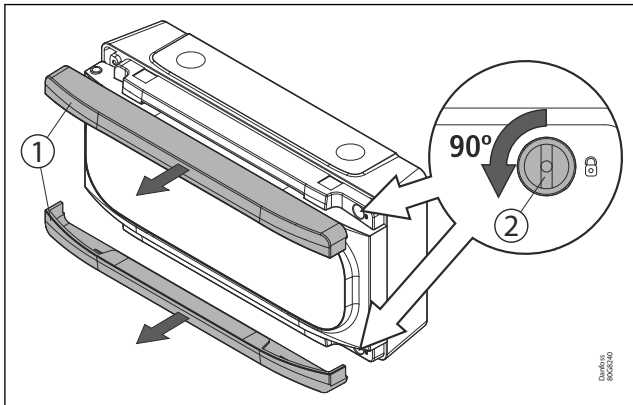


Figure 26:

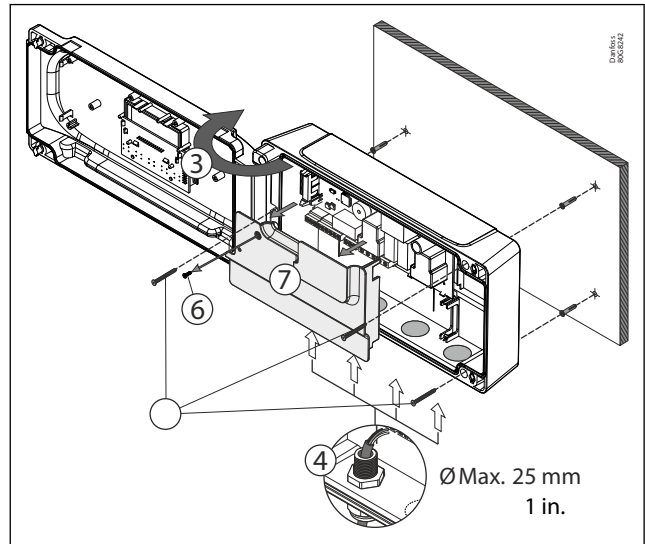


Figure 27:

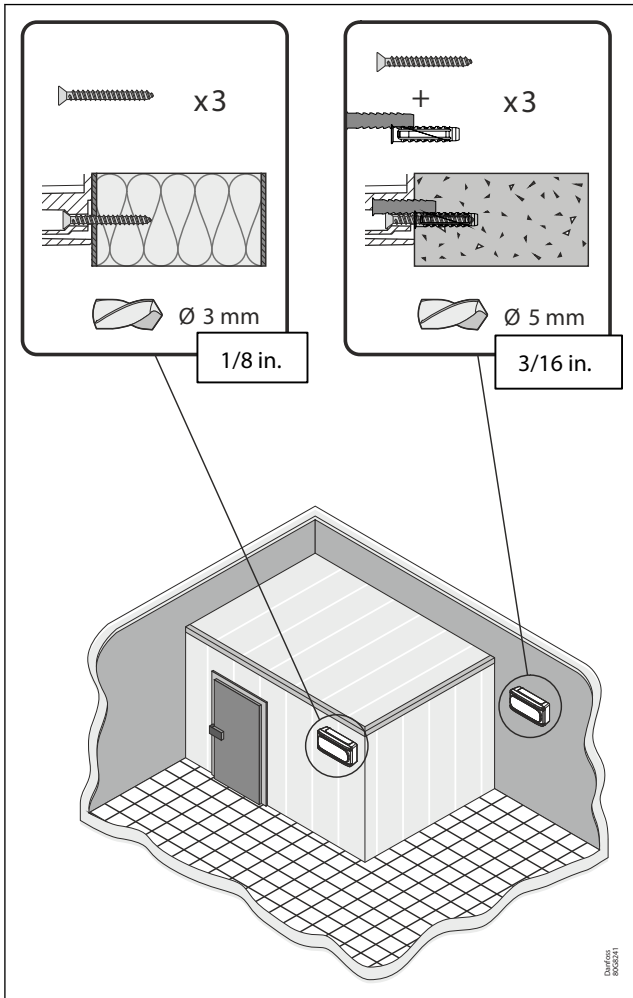


Figure 28:

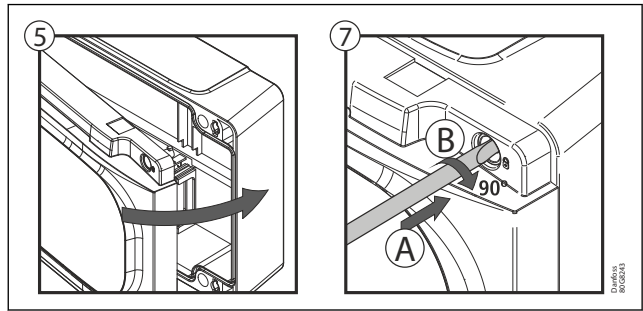
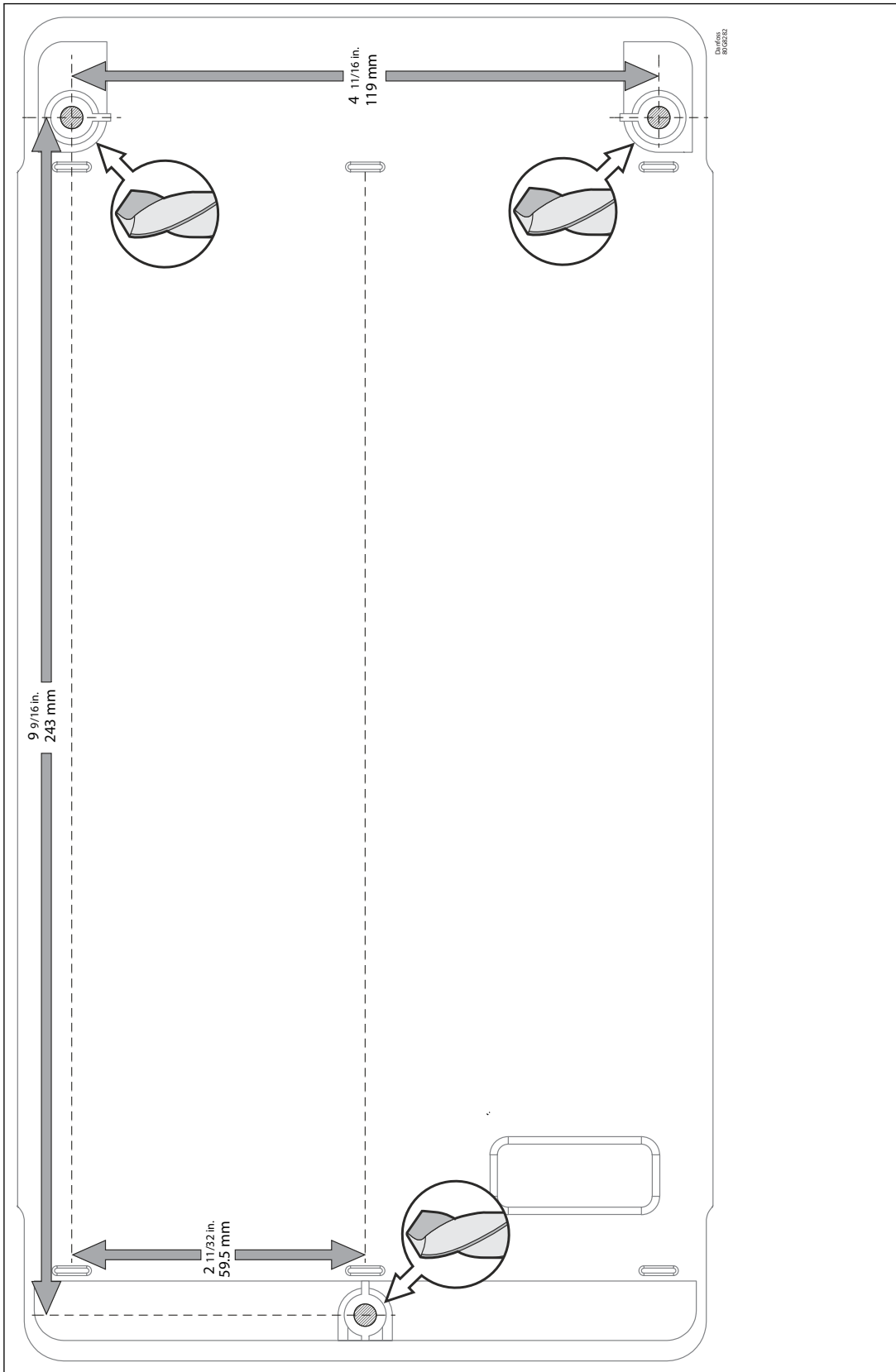


Figure 29:





## Ordering

**Table 4: Product part numbers**

Description	Include	Code No.
AK-RC 204B	1 x 1.5 m NTC 10K sensor	080Z5001
AK-RC 205C	1 x 3.0 m NTC 10K sensor	080Z5002
AK-RC 305W	2 x 1.5 m NTC high precision sensor	080Z5003

**Table 5: Accessories part numbers**

Description	Qty	Code No.
3.5 m NTC 10K sensor	1	084N3210
8.5 m NTC 10K sensor	50	084N3208
1.5 m NTC 10K sensor	150	084N3200
1.5 m NTC 10K high precision sensor <sup>(1)</sup>	1	080Z3216

<sup>(1)</sup> Only for AK-RC 305W-SD.

## Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for the product. 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](http://danfoss.com) or contact your local Danfoss representative if you have any questions.

### Certificates, declarations, and approvals

Table 6: Certificates, declarations, and approvals

File name	Document type	Document topic	Approval authority
AK-RC 204B	EMC/LVD/RoHS	CE	EU
AK-RC 205C	EMC/LVD/RoHS	CE	EU
AK-RC 305W	EMC/LVD/RoHS	CE	EU

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