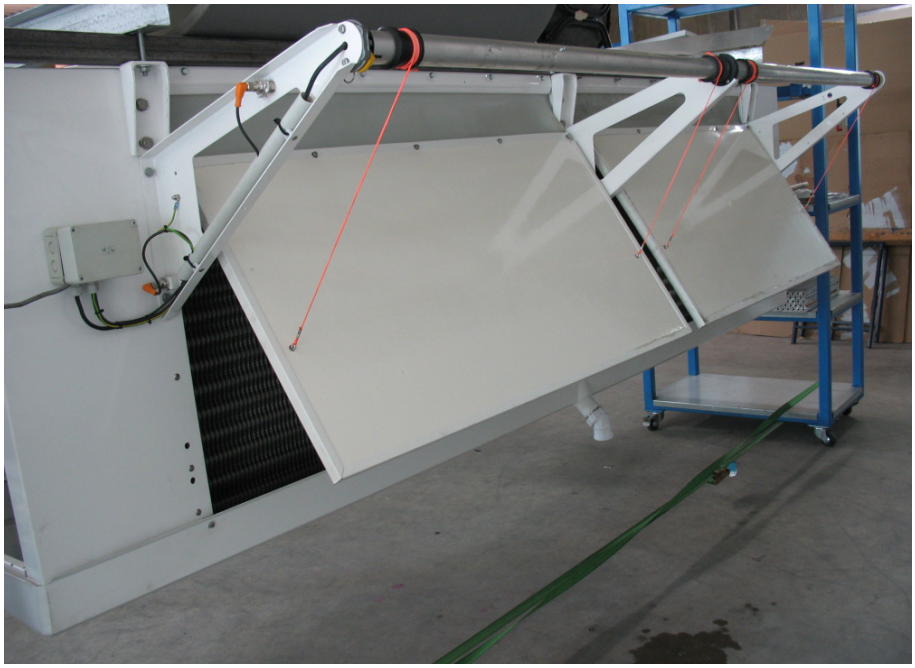
Operating and installing instructions



Product line:	Accessories
Model range description:	Defrost flap
Model range:	Defrost flap

Contents

1.) Description of the defrosting process of evaporators / air coolers with hot gas or electric defrost

1.1 Defrost cycle

The defrost cycle
- twice a day
- once a day
- at two day intervals
- at three day intervals

has to be determined by the operator.

The defrost cycle depends essentially on:
- Plant parameters (the larger the difference between the air inlet temperature and the evaporating temperature, the more frequent the defrosting is necessary)
- Reefer cargo (packaged or unpackaged)
- Intervals of charging and withdrawal (amongst others the daily operating time or the operating time on weekends)
- Disposition ofa pre-cooling room (with or without dehumidification of the reefer cargo/refrigerated goods)
- Diposition of an air curtain plant

The defrost cycle has to be optimised by the plant contractor or the operator on site. The defrost cycle can also be optimally adapted to the refrigerating operation via an adaptive and intelligent defrost regulation system, especially for changing loading and withdrawal intervals. All control elements for the defrosting process have to be installed on site by the operator.

1.2 Defrosting process, defrost parameters

The following table **1.2.1 defrosting process, defrost parameters** serves only as a reference value. For each evaporator / air cooler the values have to be adjusted individually to the particular conditions.

The operator has to adjust the defrosting so that the complete defrosting process is guaranteed, i.e. that there are no frost residues or ice in the heat exchanger coil or on the structural parts in the casing.

During the first five defrost cycles after the initial operation (stationary operation), the operator has to carry out corresponding corrections on the defrost control elements (temperature sensor, clock timer) to guarantee that the defrosting process is carried out completely.

Additionally the operator has to carry out a control concerning the completeness of the defrosting process monthly or in case of changed operating conditions with a selected defrosting procedure.

- In case of the non-observance of these duties the warranty claim expires.
- Subject to technical amendments without prior notice!

1.2.1 Table: defrosting process, defrost parameters

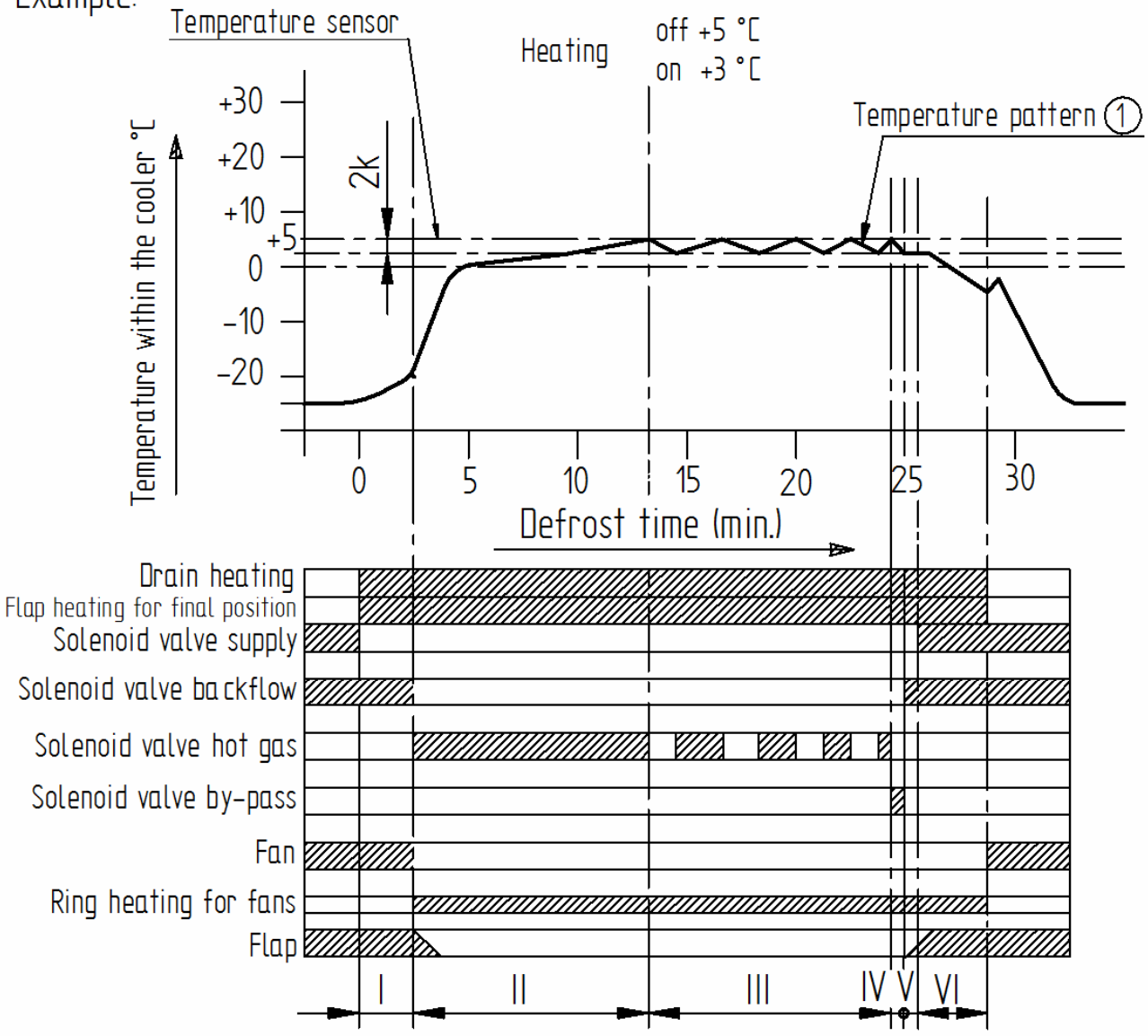
	Cooling	*Aspiration*	*Close flap*	*Defrosting (defrost phase + pause)*	*Drip off phase*	*Freeze-on phase [5])*	*Open flap*	*Refrigeration mode*
Time in min.	*See diagram 2.2 "Defrost cycle"*							
Sensor for approx. final defrost temperature in heat exchanger coil				*max.+ 5°C [2])* *max. +5°C [3])*				
Safety temperature limiter for the flap sheet and the cooler	-	-	-	*+ 40°C* ! ⚠	-	-	-	-
Max. defrost time approx.				*25 min [2])* *40 min [3])* ⚠				
Min. defrost time approx.				*10 min*				
Fluid valve	opened	closed	closed	closed	closed	opened	opened	opened
Flap	opened	opened	close	closed	closed	open	opened	opened
Heating; coil + tray	off	off	off	on	off	off	off	off
Heating; drain	off	on	on	on	on	on	on	off
Final position of flap heating, if installed	off	on	on	on	on	on	on	off
Fan	on	on	off	off	off	off	off	on
Standstill heating, ring heating for fans if installed [6])	off	off	on	on	on	on	on	off
Suction valve	opened	opened	opened	closed	closed *[4])*	opened	opened	opened
Remarks	*1) approx. 1 hour before starting the defrosting*			*[2]) Hot gas defrosting* *[3]) Elektrical defrosting* *[4]) Retention time for protection of main valve according to determination of plant contractor.*		*[5]) Residual moisture in the heat exchanger coil and in the casing is completely frozen.*		*[6]) on, if motor is turned off.*

⚠ **Respect warning for visual inspection!**

! Safety temperature limiter has to be used for electric defrost
(see **1.4 "Special features of electric defrost"**).

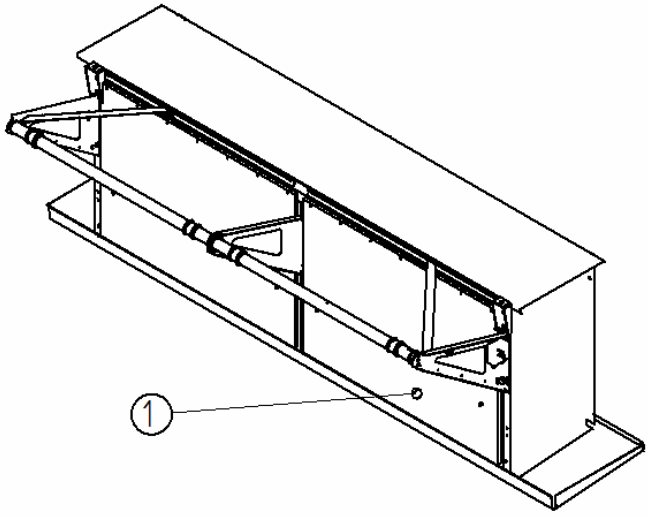
1.2.2 Diagram of defrost process in time
a.) Hot gas defrost

Example:



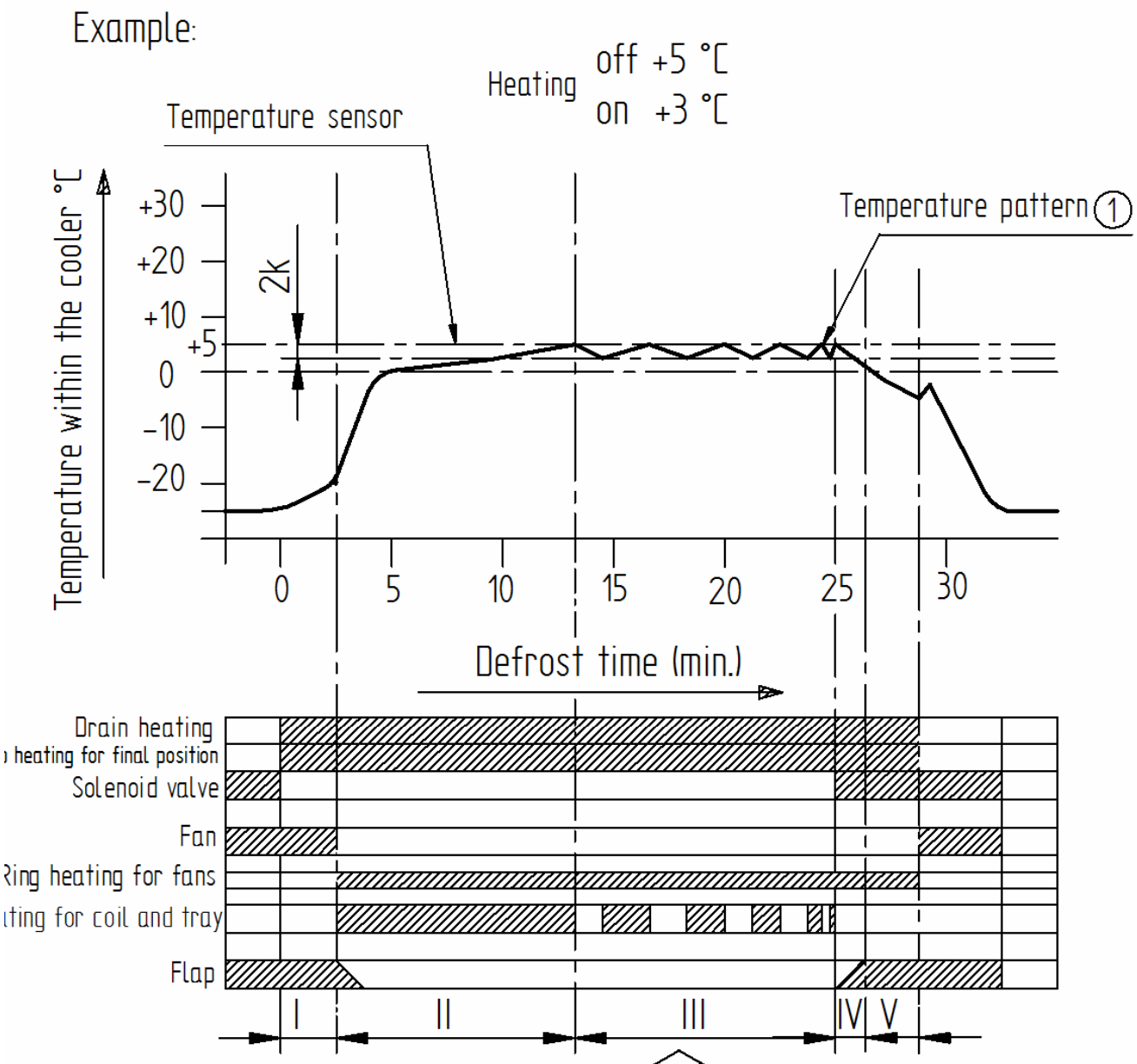
Legend:

I Aspiration
II Defrost phase
III Dwell phase
IV Expansion
V Drip off phase
VI Freeze-on phase
On
Off



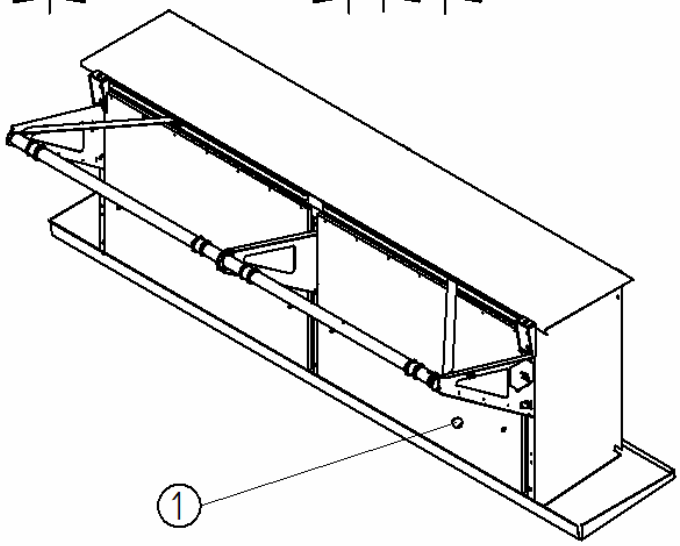
b.) Electric defrost

Example:



Legend:

I Aspiration
II Defrost phase
III Dwell phase
IV Drip off phase
V Freeze-on phase
On
Off



1.2.3 Defrosting: general remarks

The defrosting has to be supervised during the first operating phases of the refrigerating plant and the defrost process has to be checked for its completeness (see **initial warning**).
After defrosting, a **visual inspection** concerning the completeness of the defrosting has to be carried out.

1. The defrosting processes have to be controlled in a way that there is no ice and only frost on the heat exchanger surface before defrosting.
2. The heat exchanger coil has to be inspected in its complete depth for residual ice. In general, a powerful additional light source with a directed light beam is necessary for this purpose. The increased formation of residual ice, especially on the evaporator tubes, can damage the heat exchanger coil of the evaporator / air cooler and leads to refrigerant leakages!
3. Also the ground below the heat exchanger coil and the drip tray have to be free of residual ice. However, if there is residual ice, the limiting temperatures at the temperature sensors have to be elevated and the defrost times have to be extended.

If, despite the max. defrost time, the defrosting process is still not complete, the causes provoked by the plant have to be determined and resolved. In case of need, the manufacturer must be consulted.

4. If the percentage of humidity in the casing is to high after defrosting (mist and larger amount of condensate on the inside walls of the casing), the limiting temperatures of the temperature sensors have to be lowered, but only to such an extent that a complete defrosting process is still guaranteed. A too high humidity percentage compromises the service life of the bearing and the electrical parts.

The temperature of the defrosting process and the end of defrosting results is controlled by final defrosting temperature sensor (evaporator sensor).

If the final defrosting temperature can not be reached, the defrosting can be terminated additionally by a time limit in order to ensure the availability of the plant for cooling. In this case a notice of malfunction has to be reported and the cause has to be determined.

The maximum temperature is controlled by a safety temperature limiter.

It is not sufficient to regulate the defrosting process only via a time limit, because a time limit does not consider the changing operating conditions.

For evaporators / air coolers, the final defrosting temperature sensor for defrosting has to be installed in the existing empty tube or in the heat exchanger coil so that it touches the fin. The safety temperature limiter has to be mounted in the same way. (see drawing "3. Operating note").

Before changing to cooling operation, it has to be observed that the final position sensor "flap open" has to have switched before the fan is turned on. Otherwise an alarm signal has to be activated with the message "Flap of evaporator / air cooler "X" did not open after defrosting" and all performance outputs of this evaporator / air cooled jhave to be switched off.
Accordingly it has to be observed at the beginning of the defrost, if the flap is closed.
The final position sensors are exclusively designated for the monitoring of the final positions of the flap and ***have therefore only signal function [alarm, release of the processes (defrosting and cooling)].***
The servomotor ***may not*** be switched ***directly*** off via the final position sensors! Primarily, the disconnection of the actuating drive is effected via the the internal limit switches of the drive, so that the flap will reach the correct final position in any case. Secondarily, the disconnection of the actuating drive can additionally be used via the final position sensors (installation by customer), after the following time intervals: operating time + stop delay – about 10 sec. **In case of failure (no final position) the secondary disconnection via the final position sensors is effective.**

1.3 Special features for hot gas defrost

1.3.1 Fitting-in of the hot gas line

The hot gas inlet in the heat exchanger coil can be effected

- from below into the refrigerant supply line
- from above into the refrigerant supply line.

The flow of the hot gas is determined by the constructing engineer.
Both types of fitting-in have been proved in practice. The fitting-in of the hot gas line into the refrigerant supply line from below has the advantage that the heating of the frosted heat exchanger surfaces is effected evenly at a slight temperature increase. If a drip tray is used, the hot gas always has to enter the hot gas tubes of the drip tray first before entering the heat exchanger coil. The fitting-in of the check valve has to be effected depending on the flow of the hot gas.

1.3.2 Required amount of hot gas

For producing an effective defrost time the amount of hot gas has to be at least the double or the triple of the refrigerant amount during cooling operation. The condensing temperature has to be at least +25 °C.

Example:

- Q_0 = 100 kW
- t_0 = -40 °C
- Refrigerant: NH_3; pump operation; circulation index (pump rate) n = 3.5
- Cooling operation: m_{KM} = 250 kg/h (pump operation 3.5 times: m_{KM} = 875 kg/h)
- Defrost mode: m_{HG} = 500 to 750 kg/h

1.3.3 Plant wiring requirements

During the defrosting process the pressure in the heat exchanger coil decreases quickly (due to the sudden decrease of the specific volume during the condensation of the hot gas) and thus a quick dispersion of the liquid-vapour mixture coming out of the evaporator would occur without using the condensing heat completely. A pressure-loaded overflow valve, a float valve or a main valve / solenoid valve combination or the like has to be inserted into the condensate backflow line.
During defrosting, the overflow valve, etc. shall back up the condensed refrigerant in the evaporator to achieve the complete utilization of the condensing heat
in periodic operation and to provide for an even temperature distribution in the evaporator coil.

1.4 Electric defrost: Additional special features

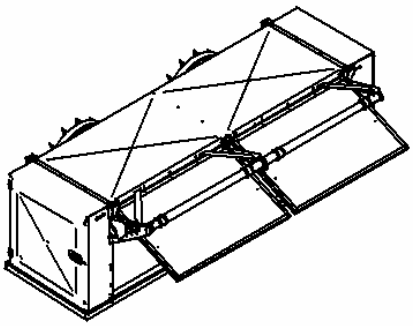
Due to the locally high heating rod temperatures during the electric defrost, the risk of a too sharp increase of the temperature within the evaporator / air cooler is involved before the coil is free of ice.

Therefore it is necessary to install a safety temperature limiter in addition to the final defrost temperature sensor.

When the maximally set temperature is reached in the evaporator / air cooler (see **table 1.2.1 "Defrost process, defrost parameters"**) the electrical heating has to be shut off. Only at the end of a pre-set cycle time (4 min. for example) and after the temperature dropped below the pre-set value (set value or maximum value), the electrical heating is switched on again.
Thus the temperature in the heat exchanger coil of the evaporator / air cooler can not be exceeded.
The temperature sensor for the termination of the defrosting process in the heat exchanger coil has to be set according to the **table 1.2.1 "defrosting process, defrost parameters".**

2.) Installation instructions

Defrost flap GHN.2, AGHN.2, GGHN.2



Subject to technical amendments without prior notice!

Güntner AG & Co. KG

-30 to +60 °C

Check !

ok !

A

Type	A
040.2 ..	600mm
045.2 ..	700mm
050.2 ..	800mm
071.2 ..	980mm
080.2 ..	1280mm

Defrost flap bracket

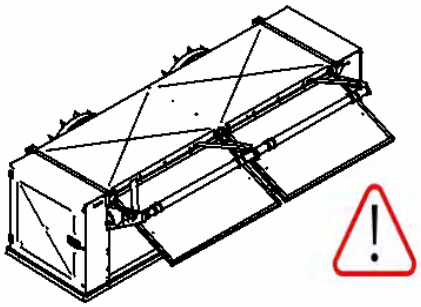
M6 x 20

M8 x 20 (1x)
ø 8,2 (2x)
M8 (1x)

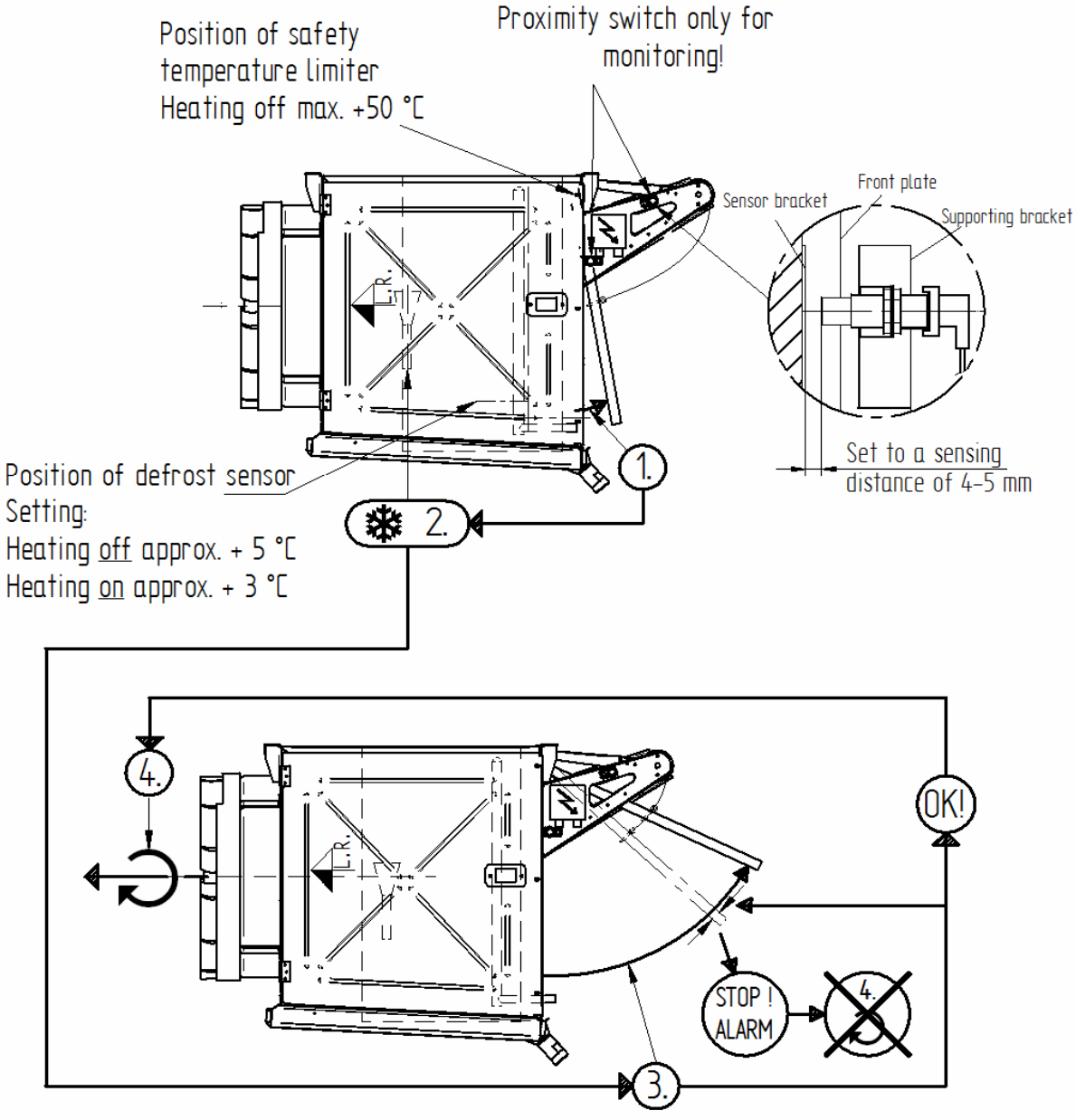
M8 x 20 (1x)
ø 8,2 (2x)
M8 (1x)

M8 x 20 (1x)
ø 8,2 (2x)
M8 (1x)

M4 x25 (1 x)
ø 8,2 (2x)
M8 (1 x)



3.) Note for operation!



4. Connection and setting instructions for the drive of the tackle flap

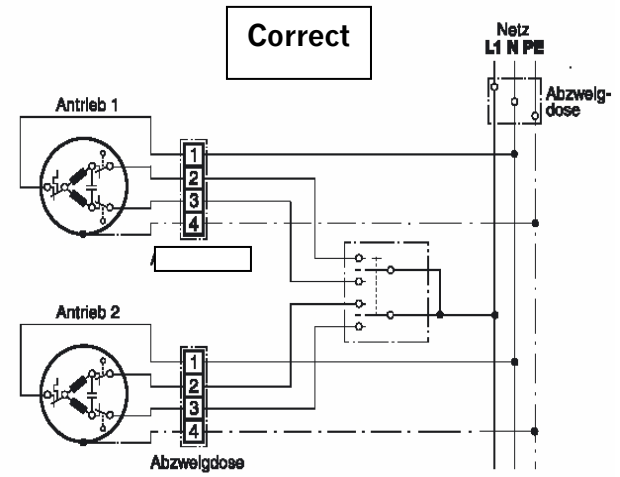
Description of the drive

The drive consists of a built-in motor (230V / 1PH / 50Hz) with installed limit switch, break and gearbox.

The installation, control and initial operation of a 230 V plant may only be executed by an electrician (according to VDE 0100 (Verband Deutscher Elektrotechniker - German Electrotechnology Federation GEF).

Drive in wet rooms

The drives are splash-proof according to EN 60529. For the use in wet rooms, GEF regulations, among others 0100/parts 701, 702, and 737, and the regulations of the local EVU (electric utility) and TÜV (technical inspection service) have to be observed and fulfilled.



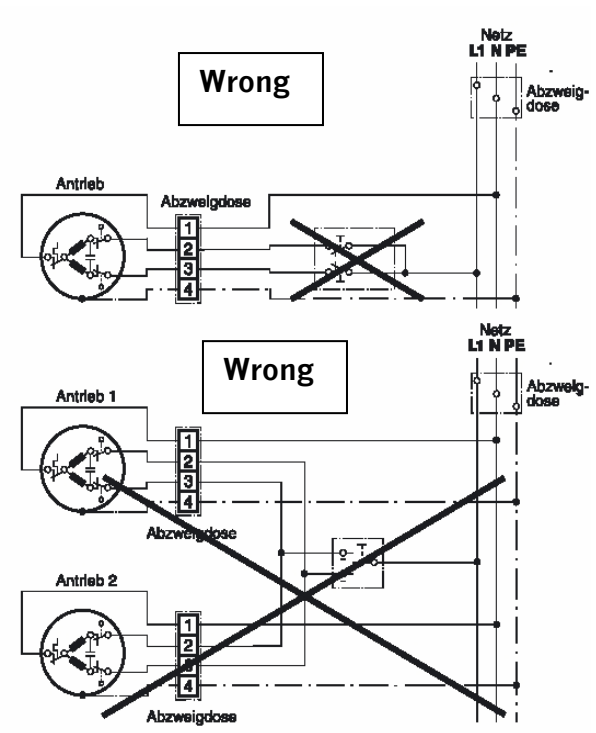
Admissible triggering of two drives with one switch

The parallel connection of two or more drives is prohibited!

Combined operation of two plants

For each drive and each driving direction a separate contact has to be provided. For the combined control of several drives control elements are necessary.

The plant has to be connected to a low voltage mains by a contactor with an all-pole separation and a contact gap of min. 3 mm.



Switches and controls may not render possible a simultaneous on and off command

A simultaneously given on and off command leads to a short-circuit of the operating capacitor. For this reason only electrical or mechanically locked switching contacts (no light switches) may be used.

The transit time for the change in driving direction
On/off or off/on has to be greater than / equal 500 ms

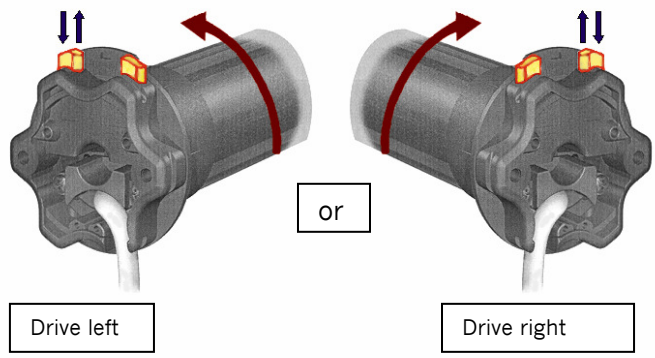
Control elements, in which the transit time can be changed on the software side, have to be programmed with the recommended transit time greater than / equal 500 ms.

For the protection of the drive the motor voltage of the drive should be turned off by the control element after 3 min.

Legend:
Antrieb – drive
Abzweigdose – Junction box
Netz – Mains

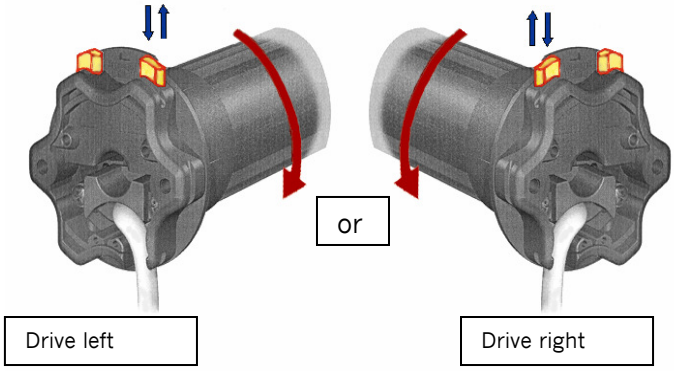
5.) Setting of the upper and lower final positions

In case of installation at factory the final positions are pre-set.



Check if both adjusting buttons are locked into place.

Final position 1:
- Adjust flap to desired final position (direction of rotation 1 - closed)
- Unlock the adjusting button that is located in the direction of rotation 1 by pressing the button again.
Final position 1 is set.

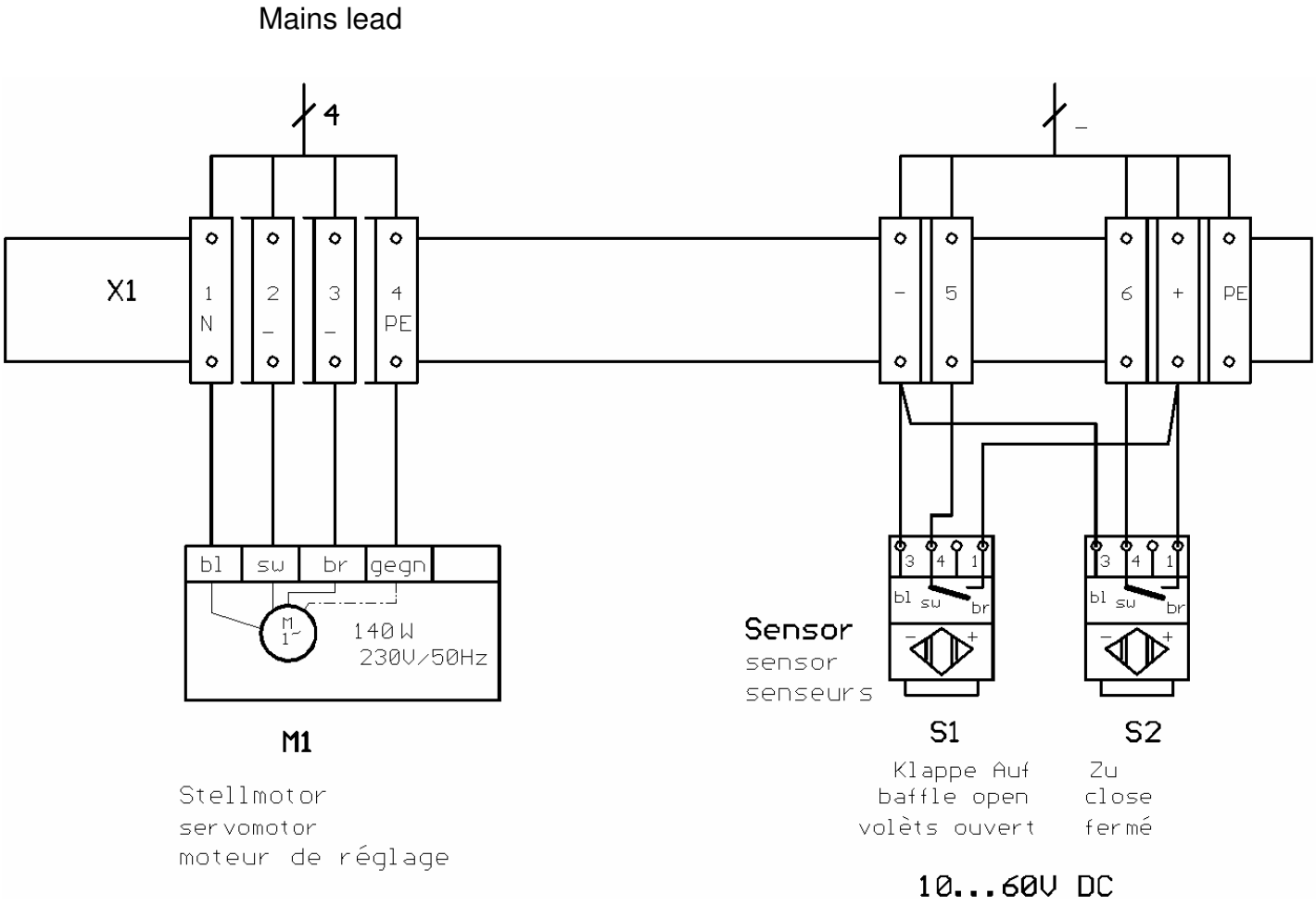


Final position 2:
- Adjust flap to final position 2 (direction of rotation 2 - open)
- Unlock the adjusting button that is located in the direction of rotation 2 by pressing the button again.
Final position 2 is set.

- Mount protection flaps for the adjusting buttons

Test run:	Let the drive run in both driving directions until it stops in the final positions. ⚠ During the test runs and the operation it has to be avoided that the drive is overheated. The overheating results from the non-observance of the drive's mode of operation and can activate the installed thermal contact. In this case wait at least 10 min., then the drive is ready for operation again. Drives that have been overheated once have an increased noise emission.
Changing of the set final position...	- Press the adjusting button that is located in the direction of rotation. - Set flap to desired final position. - Press adjusting button again to unlock it. Done!

6. Connection plan for electrical servo motor and flap



Terminals 2.5 mm²

Design of the cross sections for the mains lead has to be effected by a local electrician according to table 8 GEF.

The fuse protection has to be adjusted to the current consumption according to the regulations, the max. fuse protection may not exceed 10 A.

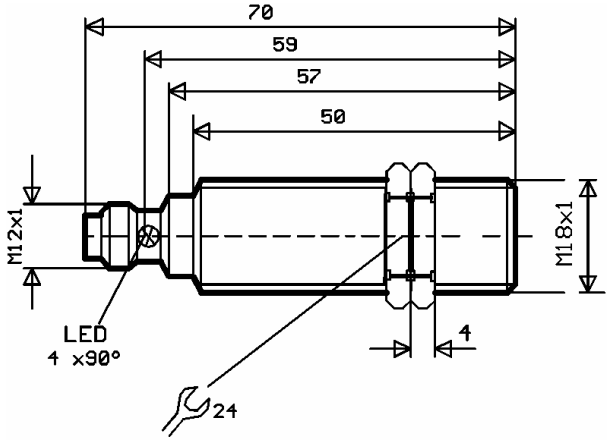
7. Technical data sheet of final position sensor Article code 4186

IGM204

IGK3008-BPKG/M/60V/US
Metal thread M18 x 1
Plug-in connection

Increased sensing distance
Gold-plated contacts
e1 type approval

Sensing distance 8 mm [b]
Flush mountable

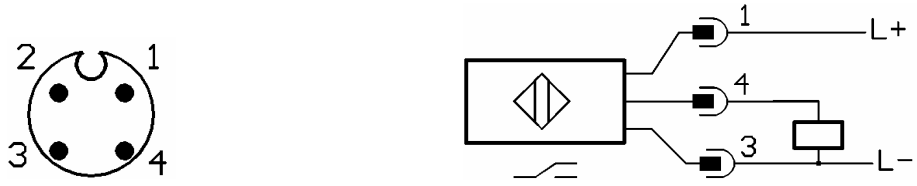


Electrical design	**DCP PNP**
Output function	**normally open contact (NOC)**
Operating voltage [V]	10...60 DC
Current carrying capacity [mA]	200
Short-circtui protection, clocked	•
reverse-polarity protected / overload-proof	• / •
Voltage drop [V]	< 2,5
Current consumption [mA]	< 10
Protected sensoring distance [mm]	6.48
Environmental audit	Vibration resistance (EN 60068-2-6 Fc): 20g; 10...3000Hz; at -20°C and +50°C; 50 frequency cycles; 1 octave/minute; on 3 axis Shock resistance (EN 60068-2-27 Ea): 100 g; 11 ms half-sine; 3 shocks each in each direction of the 3 coordinate axis at -40 °C and 85 °C Resistance to continuous shocks (EN 60068-2-30 Eb): 40g; 6ms; at 4000 shocks in each direction of the 3 coordinate axis at -20 °C and 50 °C Thermal shock (EN 60068-2-14 Na): TA=-40°C; TB=85°C; t1=30min; t2=<10s; 50 Zyklen
	Salt spray fog testing (EN 60068-2-52 Kb): Severity level 5 (4 test cycles)
Hysteresis [% / Sr]	1...20
Switching frequency [Hz]	200
Correction factors	steel (St37) = 1 / V2A approx. 0.7 / Ms approx. 0.5 / Al approx. 0.45 / Cu approx. 0.35

IGM204

Ambient temperature [°C]	-40.....85
Protection type, protection class	IP 67 / IP 69K
EMV	Automobile sector Emitted interference and resistance to interference according to automobile directive 95/54/EG (e1 type approval) Resistance to interference according to DIN ISO 11452-2 (German standard) : 100 V/m Conducted disturbance according to ISO 7637-2: Pulse 1 2 3a 3b 4 5 Severity level IV IV IV IV IV IV Failure criteria C C A A A C EN 61000-4-2: CD: 4kV / AD: 8kV EN 61000-4-3: 10V/m (80...1000MHz) EN 61000-4-4: 2kV EN 61000-4-5: Mains line to line: 0.5kV EN 61000-4-6: 10V (0.15...80MHz)
	EN 55011: Class B
Casing materials	Casing: stainless steel
	active surface:
Function display Switching status LED	yellow (4x90°)
Connections	M12 plug-in connection, gold-plated contacts

Connection diagram



Accessories (included)	2 mounting nuts

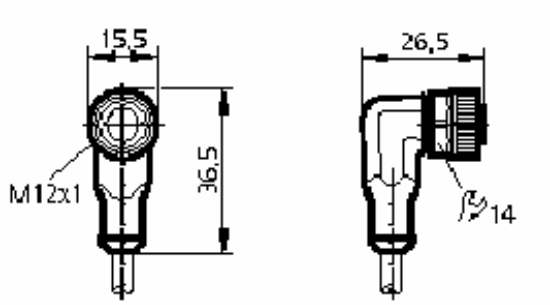
Cable socket Article code 4187 for **Final position sensor** Article code 4186

EVC004

Cable socket

For sensors with
M12 plug-in connection

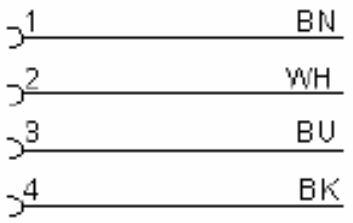
free of silicone
free of halogen
contacts gold-plated



	cULus
Electrical design	AC/DC
Operating voltage [V]	250 AC / 300 DC
Current-carrying capacity [A]	4 *)
Design	angled
Ambient temperature [°C]	-40...90
Protection type	Protection type IP 67 / IP 68 / IP 69K •
Material of handle	Casing: TPU orange; gasket: Viton
Material of union nut	Brass; nickel-plated
Starting torque Union nut [Nm]	0,6...1,5
Connection	PUR cable / 2 m 4 x 0,34 mm² (42 x Ø 0,1 mm); Ø 4,9 mm; free of halogen
Colour of coating	black

Connection diagram

Colours of insulated wires
BK black
BN brown
BU blue
WH white



Remarks	*) cRUus: 3 A