



Powering Business Worldwide

**208218****DILM 650/22(RA110)**[Overview](#)[Specifications](#)[Resources](#)[Delivery program](#)[Technical data](#)[Design verification as per  
IEC/EN 61439](#)[Technical data ETIM 7.0](#)[Approvals](#)[Characteristics](#)[Dimensions](#)

## DELIVERY PROGRAM

Product range  
Contactors

Application  
Contactors for Motors

Subrange  
Comfort devices greater than 170 A

Utilization category  
AC-1: Non-inductive or slightly inductive loads, resistance  
furnaces  
NAC-3: Normal AC induction motors: starting, switch off  
during running  
AC-4: Normal AC induction motors: starting, plugging,  
reversing, inching

Connection technique  
Screw connection

### Rated operational current

AC-3  
380 V 400 V [ $I_n$ ]  
650 A

AC-1  
Conventional free air thermal current, 3 pole, 50 - 60 Hz  
Open  
at 40 °C [ $I_{th} = I_n$ ]  
1041 A

AC-1  
Conventional free air thermal current, 1 pole  
open [ $I_{th}$ ]

2125 A

**Max. rating for three-phase motors, 50 - 60 Hz**

AC-3  
220 V 230 V [F]  
205 kW

AC-3  
380 V 400 V [F]  
355 kW

AC-3  
660 V 690 V [F]  
630 kW

AC-3  
1000 V [F]  
600 kW

AC-4  
220 V 230 V [F]  
161 kW

AC-4  
380 V 400 V [F]  
280 kW

AC-4  
660 V 690 V [F]  
494 kW

AC-4  
1000 V [F]  
509 kW

Contact sequence



Can be combined with auxiliary contact  
DILMB20-XH...

Actuating voltage  
RA 110: 48 - 110 V 40 - 60 Hz/48 - 110 V DC

Voltage AC/DC  
AC and DC operation

**Contacts**

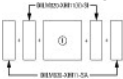
N/O = Normally open  
2 N/O

N/C = Normally closed  
2 N/C

Auxiliary contacts

possible variants at auxiliary contact module fitting options  
on the side: 2 x DILM820-XH11(V)-S; 2 x DILM820-XH11-SA

Side mounting auxiliary contacts



Instructions

Interlocked opposing contacts according to IEC/EN 60947-5-1 Appendix L, inside the auxiliary contact module  
Auxiliary contacts used as mirror contacts according to IEC/EN 60947-4-1 Appendix F (not N/C late open)

Instructions

integrated suppressor circuit in actuating electronics  
660 V, 690 V or 1000 V: not directly reversing

TECHNICAL DATA

General

Standards  
IEC/EN 60947, VDE 0660, UL, CSA

Lifespan, mechanical  
AC operated [Operations]  
5 x 10<sup>6</sup>

Lifespan, mechanical  
DC operated [Operations]  
5 x 10<sup>6</sup>

Operating frequency, mechanical  
AC operated [Operations/h]  
1000

Operating frequency, mechanical  
DC operated [Operations/h]  
1000

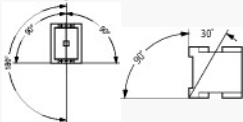
Climatic proofing  
Damp heat, constant, to IEC 60068-2-78  
Damp heat, cyclic, to IEC 60068-2-30

Ambient temperature  
Open  
-40 - +60 °C

Ambient temperature  
Enclosed  
- 40 - + 40 °C

Ambient temperature  
Storage  
- 40 - + 80 °C

Mounting position



Mechanical shock resistance (IEC/EN 60068-2-27)  
Half-sinusoidal shock, 10 ms  
Main contacts  
N/O contact  
10 g

Mechanical shock resistance (IEC/EN 60068-2-27)  
Half-sinusoidal shock, 10 ms  
Auxiliary contacts  
N/O contact  
10 g

Mechanical shock resistance (IEC/EN 60068-2-27)  
Half-sinusoidal shock, 10 ms  
Auxiliary contacts  
N/C contact  
8 g

Degree of Protection  
IP00

Protection against direct contact when actuated from front  
(EN 50274)  
Finger and back-of-hand proof with terminal shroud or  
terminal block

Altitude  
Max. 2000 m

Weight  
AC operated  
16.21 kg

Weight  
DC operated  
16.21 kg

Weight  
Weight  
16.21 kg

Terminal capacity main cable  
Flexible with cable lug  
50 - 240 mm<sup>2</sup>

Terminal capacity main cable  
Stranded with cable lug  
70 - 240 mm<sup>2</sup>

Terminal capacity main cable  
Solid or stranded

2/0 - 500 MCM AWG

Terminal capacity main cable  
Flat conductor [Lamellenzahl x Breite x Dicke]  
Fixing with flat cable terminal or cable terminal blocks  
See terminal capacity for cable terminal blocks mm

Terminal capacity main cable  
Busbar [Width]  
50 mm

Main cable connection screw/bolt  
M10

Tightening torque  
24 Nm

Terminal capacity control circuit cables  
Solid  
1 x (0.75 - 2.5)  
2 x (0.75 - 2.5) mm<sup>2</sup>

Terminal capacity control circuit cables  
Flexible with ferrule  
1 x (0.75 - 2.5)  
2 x (0.75 - 2.5) mm<sup>2</sup>

Terminal capacity control circuit cables  
Solid or stranded  
18 - 14 AWG

Control circuit cable connection screw/bolt  
M3.5

Tightening torque  
1.2 Nm

Tool  
Main cable  
Width across flats  
16 mm

Tool  
Control circuit cables  
Pozidriv screw driver  
2 Size

## Main conducting paths

Rated impulse withstand voltage [U<sub>imp</sub>]  
8000 V AC

Overvoltage category/pollution degree  
III/3

Rated insulation voltage [U]  
1000 V AC

Rated operational voltage [ $U_e$ ]  
1000 V AC

Safe isolation to EN61140  
between coil and contacts  
500 V AC

Safe isolation to EN61140  
between the contacts  
500 V AC

Making capacity (p.f. to IEC/EN 60947)  
7800 A

Breaking capacity  
220 V 230 V  
6500 A

Breaking capacity  
380 V 400 V  
6500 A

Breaking capacity  
500 V  
6500 A

Breaking capacity  
660 V 690 V  
6500 A

Breaking capacity  
1000 V  
4350 A

Component lifespan  
AC1: See → Engineering, characteristic curves  
AC3: See → Engineering, characteristic curves  
AC4: See → Engineering, characteristic curves

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "2" coordination  
400 V [gG/gL 500 V]  
630 A

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "2" coordination  
690 V [gG/gL 690 V]  
630 A

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "2" coordination  
1000 V [gG/gL 1000 V]  
500 A

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "1" coordination  
400 V [gG/gL 500 V]  
1000 A

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "1" coordination  
690 V [gG/gL 690 V]  
1000 A

Short-circuit rating  
Short-circuit protection maximum fuse  
Type "1" coordination  
1000 V [gG/gL 1000 V]  
630 A

## AC

AC-1  
Rated operational current  
Conventional free air thermal current, 3 pole, 50 - 60 Hz  
Open  
at 40 °C [ $I_{th} = I_n$ ]  
1041 A

AC-1  
Rated operational current  
Conventional free air thermal current, 3 pole, 50 - 60 Hz  
Open  
at 50 °C [ $I_{th} = I_n$ ]  
931 A

AC-1  
Rated operational current  
Conventional free air thermal current, 3 pole, 50 - 60 Hz  
Open  
at 55 °C [ $I_{th} = I_n$ ]  
888 A

AC-1  
Rated operational current  
Conventional free air thermal current, 3 pole, 50 - 60 Hz  
Open  
at 60 °C [ $I_{th} = I_n$ ]  
850 A

AC-1  
Rated operational current  
Conventional free air thermal current, 1 pole  
Note  
at maximum permissible ambient air temperature

AC-1  
Rated operational current  
Conventional free air thermal current, 1 pole  
open [ $I_{th}$ ]  
2125 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
Notes  
At maximum permissible ambient temperature (open.)

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
220 V 230 V [ $I_n$ ]

650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
240 V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
380 V 400 V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
415 V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
440V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
500 V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
660 V 690 V [I<sub>e</sub>]  
650 A

AC-3  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
1000 V [I<sub>e</sub>]  
435 A

AC-3  
Motor rating [P]  
220 V 230 V [P]  
205 kW

AC-3  
Motor rating [P]  
240V [P]  
225 kW

AC-3  
Motor rating [P]  
380 V 400 V [P]  
355 kW

AC-3  
Motor rating [P]  
415 V [P]  
390 kW

AC-3  
Motor rating [P]  
440 V [P]  
420 kW

AC-3  
Motor rating [P]  
500 V [P]  
470 kW

AC-3  
Motor rating [P]  
660 V 690 V [P]  
630 kW

AC-3  
Motor rating [P]  
1000 V [P]  
600 kW

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
220 V 230 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
240 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
380 V 400 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
415 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
440 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
500 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz  
660 V 690 V [I<sub>e</sub>]  
512 A

AC-4  
Rated operational current  
Open, 3-pole: 50 – 60 Hz

1000 V [ $I_b$ ]  
348 A

AC-4  
Motor rating [ $P$ ]  
220 V 230 V [ $P$ ]  
161 kW

AC-4  
Motor rating [ $P$ ]  
240 V [ $P$ ]  
176 kW

AC-4  
Motor rating [ $P$ ]  
380 V 400 V [ $P$ ]  
280 kW

AC-4  
Motor rating [ $P$ ]  
415 V [ $P$ ]  
307 kW

AC-4  
Motor rating [ $P$ ]  
440 V [ $P$ ]  
326 kW

AC-4  
Motor rating [ $P$ ]  
500 V [ $P$ ]  
370 kW

AC-4  
Motor rating [ $P$ ]  
660 V 690 V [ $P$ ]  
494 kW

AC-4  
Motor rating [ $P$ ]  
1000 V [ $P$ ]  
509 kW

### Condensor operation

Individual compensation, rated operational current  $I_b$  of  
three-phase capacitors  
Open  
up to 525 V  
463 A

Individual compensation, rated operational current  $I_b$  of  
three-phase capacitors  
Open  
690 V  
265 A

Max. inrush current peak  
 $30 \times I_b$

Component lifespan [Operations]  
 $0.1 \times 10^6$

Max. operating frequency  
200 Ops/h

### Current heat loss

3 pole, at  $I_{th}$  (60°)  
69 W

Current heat loss at  $I_b$  to AC-3/400 V  
41 W

### Magnet systems

Voltage tolerance  
 $U_S$   
48 - 110 V 40-60 Hz  
48 - 110 V DC

Voltage tolerance  
AC operated [Pick-up]  
 $0.7 \times U_{Smin} - 1.15 \times U_{Smax}$

Voltage tolerance  
DC operated [Pick-up]  
 $0.7 \times U_{Smin} - 1.15 \times U_{Smax}$

Voltage tolerance  
AC operated [Drop-out]  
 $0.2 \times U_{Smax} - 0.6 \times U_{Smin}$

Voltage tolerance  
DC operated [Drop-out]  
 $0.2 \times U_{Smax} - 0.6 \times U_{Smin}$

Power consumption of the coil in a cold state and  $1.0 \times U_S$   
Note on power consumption  
Control transformer with  $u_k \leq 7\%$

Power consumption of the coil in a cold state and  $1.0 \times U_S$   
Pull-in power [Pick-up]  
800 VA

Power consumption of the coil in a cold state and  $1.0 \times U_S$   
Pull-in power [Pick-up]  
700 W

Power consumption of the coil in a cold state and  $1.0 \times U_S$   
Sealing power [Sealing]  
26.4 VA

Power consumption of the coil in a cold state and  $1.0 \times U_S$   
Sealing power [Sealing]  
10.3 W

Duty factor  
100 % DF

Changeover time at 100 %  $U_S$  (recommended value)  
Main contacts  
Closing delay  
70 ms

Changeover time at 100 %  $U_S$  (recommended value)  
Main contacts  
Opening delay  
110 ms

Behaviour in marginal and transitional conditions  
Sealing  
Voltage interruptions  
(0 ... 0.2 x  $U_{c,min}$ )  $\square$  10 ms  
Time is bridged successfully

Behaviour in marginal and transitional conditions  
Sealing  
Voltage interruptions  
(0 ... 0.2 x  $U_{c,min}$ ) > 10 ms  
Drop-out of the contactor

Behaviour in marginal and transitional conditions  
Sealing  
Voltage drops  
(0.2 ... 0.6 x  $U_{c,min}$ )  $\square$  12 ms  
Time is bridged successfully

Behaviour in marginal and transitional conditions  
Sealing  
Voltage drops  
(0.2 ... 0.6 x  $U_{c,min}$ ) > 12 ms  
Drop-out of the contactor

Behaviour in marginal and transitional conditions  
Sealing  
Voltage drops  
(0.6 ... 0.7 x  $U_{c,min}$ )  
Contactor remains switched on

Behaviour in marginal and transitional conditions  
Sealing  
Excess voltage  
(1.15 ... 1.3 x  $U_{c,max}$ )  
Contactor remains switched on

Behaviour in marginal and transitional conditions  
Sealing  
Pick-up phase  
(0 ... 0.7 x  $U_{c,min}$ )  
Contactor does not switch on

Behaviour in marginal and transitional conditions  
Sealing  
Pick-up phase  
(0.7 x  $U_{c,min}$  ... 1.15 x  $U_{c,max}$ )  
Contactor switches on with certainty

Admissible transitional contact resistance (of the external  
control circuit device when actuating A11)  
 $\square$  500 m $\Omega$

PLC signal level (A3 - A4) to IEC/EN 61131-2 (type 2)

High  
15 V

PLC signal level (A3 - A4) to IEC/EN 61131-2 (type 2)  
Low  
5 V

### Electromagnetic compatibility (EMC)

Electromagnetic compatibility  
This product is designed for operation in industrial environments (environment A). Its use in residential environments (environment B) may cause radio-frequency interference, requiring additional noise suppression measures.

### Rating data for approved types

Switching capacity  
Maximum motor rating  
Three-phase  
200 V  
208 V  
200 HP

Switching capacity  
Maximum motor rating  
Three-phase  
230 V  
240 V  
250 HP

Switching capacity  
Maximum motor rating  
Three-phase  
460 V  
480 V  
500 HP

Switching capacity  
Maximum motor rating  
Three-phase  
575 V  
600 V  
600 HP

Switching capacity  
General use  
1041 A

Auxiliary contacts  
Flot Duty  
AC operated  
A600

Auxiliary contacts  
Flot Duty  
DC operated  
P300

Auxiliary contacts  
General Use  
AC

600 V

Auxiliary contacts  
General Use  
AC  
15 A

Auxiliary contacts  
General Use  
DC  
250 V

Auxiliary contacts  
General Use  
DC  
1 A

Short Circuit Current Rating  
Basic Rating  
SCCR  
30 kA

Short Circuit Current Rating  
Basic Rating  
max. Fuse  
2000 A

Short Circuit Current Rating  
Basic Rating  
max. CB  
1200 A

Short Circuit Current Rating  
480 V High Fault  
SCCR (fuse)  
85 kA

Short Circuit Current Rating  
480 V High Fault  
max. Fuse  
2000 A

Short Circuit Current Rating  
480 V High Fault  
SCCR (CB)  
85 kA

Short Circuit Current Rating  
480 V High Fault  
max. CB  
1200 A

Short Circuit Current Rating  
600 V High Fault  
SCCR (fuse)  
85 kA

Short Circuit Current Rating  
600 V High Fault  
max. Fuse  
2000 A

Short Circuit Current Rating  
600 V High Fault  
SCCR (CB)  
85 kA

Short Circuit Current Rating  
600 V High Fault  
max. CB  
1200 A

Special Purpose Ratings  
Definite Purpose Ratings (100,000 cycles acc. to UL 1995)  
LRA 480V 60Hz 3phase  
4350 A

Special Purpose Ratings  
Definite Purpose Ratings (100,000 cycles acc. to UL 1995)  
FLA 480V 60Hz 3phase  
725 A

Special Purpose Ratings  
Definite Purpose Ratings (100,000 cycles acc. to UL 1995)  
LRA 600V 60Hz 3phase  
4350 A

Special Purpose Ratings  
Definite Purpose Ratings (100,000 cycles acc. to UL 1995)  
FLA 600V 60Hz 3phase  
725 A

## DESIGN VERIFICATION AS PER IEC/EN 61439

### Technical data for design verification

Rated operational current for specified heat dissipation [ $I_n$ ]  
650 A

Heat dissipation per pole, current-dependent [ $P_{vd}$ ]  
13.67 W

Equipment heat dissipation, current-dependent [ $P_{vd}$ ]  
0 W

Static heat dissipation, non-current-dependent [ $P_{vs}$ ]  
6.5 W

Heat dissipation capacity [ $P_{diss}$ ]  
0 W

Operating ambient temperature min.  
-40 °C

Operating ambient temperature max.  
+60 °C

## IEC/EN 61439 design verification

10.2 Strength of materials and parts  
10.2.2 Corrosion resistance  
Meets the product standard's requirements.

10.2 Strength of materials and parts  
10.2.3.1 Verification of thermal stability of enclosures  
Meets the product standard's requirements.

10.2 Strength of materials and parts  
10.2.3.2 Verification of resistance of insulating materials to normal heat  
Meets the product standard's requirements.

10.2 Strength of materials and parts  
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects  
Meets the product standard's requirements.

10.2 Strength of materials and parts  
10.2.4 Resistance to ultra-violet (UV) radiation  
Meets the product standard's requirements.

10.2 Strength of materials and parts  
10.2.5 Lifting  
Does not apply, since the entire switchgear needs to be evaluated.

10.2 Strength of materials and parts  
10.2.6 Mechanical impact  
Does not apply, since the entire switchgear needs to be evaluated.

10.2 Strength of materials and parts  
10.2.7 Inscriptions  
Meets the product standard's requirements.

10.3 Degree of protection of ASSEMBLIES  
Does not apply, since the entire switchgear needs to be evaluated.

10.4 Clearances and creepage distances  
Meets the product standard's requirements.

10.5 Protection against electric shock  
Does not apply, since the entire switchgear needs to be evaluated.

10.6 Incorporation of switching devices and components  
Does not apply, since the entire switchgear needs to be evaluated.

10.7 Internal electrical circuits and connections  
Is the panel builder's responsibility.

10.8 Connections for external conductors  
Is the panel builder's responsibility.

10.9 Insulation properties  
10.9.2 Power-frequency electric strength  
Is the panel builder's responsibility.

10.9 Insulation properties  
10.9.3 Impulse withstand voltage  
Is the panel builder's responsibility.

10.9 Insulation properties  
10.9.4 Testing of enclosures made of insulating material  
Is the panel builder's responsibility.

10.10 Temperature rise  
The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.

10.11 Short-circuit rating  
Is the panel builder's responsibility. The specifications for the switchgear must be observed.

10.12 Electromagnetic compatibility  
Is the panel builder's responsibility. The specifications for the switchgear must be observed.

10.13 Mechanical function  
The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

## TECHNICAL DATA ETIM 7.0

Low-voltage industrial components (EG000017) / Power contactor, AC switching (EC000066)

Electric engineering, automation, process control engineering / Low-voltage switch technology / Contactor (LV) / Power contactor, AC switching (ec@ss10.0.1-27-37-10-03 [AAB718015])

Rated control supply voltage  $U_s$  at AC 50Hz  
48 - 110 V

Rated control supply voltage  $U_s$  at AC 60Hz  
48 - 110 V

Rated control supply voltage  $U_s$  at DC  
48 - 100 V

Voltage type for actuating  
AC/DC

Rated operation current  $I_e$  at AC-1, 400 V  
1041 A

Rated operation current  $I_e$  at AC-3, 400 V  
650 A

Rated operation power at AC-3, 400 V  
355 kW

Rated operation current  $I_e$  at AC-4, 400 V  
512 A

Rated operation power at AC-4, 400 V  
280 kW

Rated operation power NEMA  
373 kW

Modular version  
No

Number of auxiliary contacts as normally open contact  
2

Number of auxiliary contacts as normally closed contact  
2

Type of electrical connection of main circuit  
Rail connection

Number of normally closed contacts as main contact  
0

Number of main contacts as normally open contact  
3

## APPROVALS

Product Standards  
IEC/EN 60947-4-1; UL 60947-4-1; CSA - C22.2 No. 60947-4-1-14; CE marking

UL File No.  
E29096

UL Category Control No.  
NLDX

CSA File No.  
012528

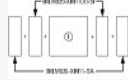
CSA Class No.  
3211-04

North America Certification  
UL listed, CSA certified

Specially designed for North America  
No

## CHARACTERISTICS

### Side mounting auxiliary contacts



possible variants at auxiliary contact module fitting options  
on the side: 2 x DILMB20-XH11(V)-S; 2 x DILMB20-XH11-  
SA

### Characteristic curve



Normal switching duty  
Normal AC induction motor  
Operating characteristics  
Switch on: from stop  
Switch off: during run  
Electrical characteristics:  
Switch on: up to 6 x Rated motor current  
Switch off: up to 1 x Rated motor current  
Utility category  
100 % AC-3  
Typical Applications  
Compressors  
Lifts  
Mixers  
Pumps  
Escalators  
Agitators  
fan  
Conveyor belts  
Centrifuges  
Hinged flaps  
Bucket-elevator  
Air-conditioning systems  
General drives for manufacturing and processing machines

### Characteristic curve



Extreme switching duty  
Squirrel-cage motor  
Operating characteristics  
Inching, plugging, reversing  
Electrical characteristics  
Make: up to 6 x rated motor current  
Break: up to 6 x rated motor current  
Utilization category  
100 % AC-4  
Typical applications  
Printing presses  
Wire-drawing machines  
Centrifuges  
Special drives for manufacturing and processing machines

### Characteristic curve



Switching conditions for 3 pole, non-motor loads  
Operating characteristics  
Non inductive and slightly inductive loads  
Electrical characteristics

Switch on: 1 x rated operational current  
Switch off: 1 x rated operational current  
Utilization category  
100 % AC-1  
Typical examples of application  
Electric heat

Characteristic curve



Short-time loading, 3-pole  
Time interval between two loading cycles: 15 minutes

## DIMENSIONS



- ☐ DILM820-XH11(V)-SI
- ☐ DILM820-XH11-SA

