



**Contactor,5,5kW/400V,AC-operated**



*Powering Business Worldwide™*

**Part no.**

**DILM12-10(110V50/60HZ)**

**Article no.**

**276836**

## Delivery programme

|                                                           |                |    |                                                                                                                                                                                                                  |
|-----------------------------------------------------------|----------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product range                                             |                |    | Contactors                                                                                                                                                                                                       |
| Application                                               |                |    | Contactors for Motors                                                                                                                                                                                            |
| Subrange                                                  |                |    | Contactors up to 170 A, 3 pole                                                                                                                                                                                   |
| Utilization category                                      |                |    | AC-1: Non-inductive or slightly inductive loads, resistance furnaces<br>AC-3: Squirrel-cage motors: starting, switching off during running<br>AC-4: Squirrel-cage motors: starting, plugging, reversing, inching |
| Connection technique                                      |                |    | Screw terminals                                                                                                                                                                                                  |
| Pole                                                      |                |    | 3 pole                                                                                                                                                                                                           |
| Rated operational current                                 |                |    |                                                                                                                                                                                                                  |
| AC-3                                                      |                |    |                                                                                                                                                                                                                  |
| 380 V 400 V                                               | $I_e$          | A  | 12                                                                                                                                                                                                               |
| AC-1                                                      |                |    |                                                                                                                                                                                                                  |
| Conventional free air thermal current, 3 pole, 50 - 60 Hz |                |    |                                                                                                                                                                                                                  |
| Open                                                      |                |    |                                                                                                                                                                                                                  |
| at 40 °C                                                  | $I_{th} = I_e$ | A  | 22                                                                                                                                                                                                               |
| enclosed                                                  | $I_{th}$       | A  | 18                                                                                                                                                                                                               |
| Conventional free air thermal current, 1 pole             |                |    |                                                                                                                                                                                                                  |
| open                                                      | $I_{th}$       | A  | 50                                                                                                                                                                                                               |
| enclosed                                                  | $I_{th}$       | A  | 45                                                                                                                                                                                                               |
| Max. rating for three-phase motors, 50 - 60 Hz            |                |    |                                                                                                                                                                                                                  |
| AC-3                                                      |                |    |                                                                                                                                                                                                                  |
| 220 V 230 V                                               | P              | kW | 3.5                                                                                                                                                                                                              |
| 380 V 400 V                                               | P              | kW | 5.5                                                                                                                                                                                                              |
| 660 V 690 V                                               | P              | kW | 6.5                                                                                                                                                                                                              |
| AC-4                                                      |                |    |                                                                                                                                                                                                                  |
| 220 V 230 V                                               | P              | kW | 2                                                                                                                                                                                                                |
| 380 V 400 V                                               | P              | kW | 3                                                                                                                                                                                                                |
| 660 V 690 V                                               | P              | kW | 4.4                                                                                                                                                                                                              |
| Contacts                                                  |                |    |                                                                                                                                                                                                                  |
| N/O = Normally open                                       |                |    | 1 N/O                                                                                                                                                                                                            |
| Contact sequence                                          |                |    |                                                                                                                                                                                                                  |
| Instructions                                              |                |    | Contacts to EN 50012.                                                                                                                                                                                            |
| Can be combined with auxiliary contact                    |                |    | DILM32-XH1..<br>DILA-XHI(V)..                                                                                                                                                                                    |
| Voltage AC/DC                                             |                |    | AC operation                                                                                                                                                                                                     |

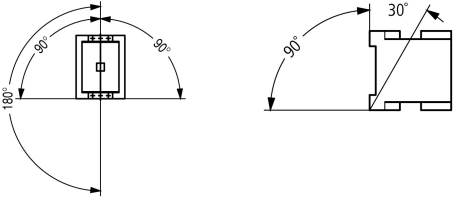
## Approvals

Product Standards  
UL File No.  
UL CCN  
CSA File No.  
CSA Class No.  
NA Certification  
Specially designed for NA

IEC/EN 60947-4-1; UL 508; CSA-C22.2 No. 14-05; CE marking  
E29096  
NLDX  
012528  
2411-03, 3211-04  
UL listed, CSA certified  
No

## General

|                      |  |  |                                 |
|----------------------|--|--|---------------------------------|
| Standards            |  |  | IEC/EN 60947, VDE 0660, UL, CSA |
| Lifespan, mechanical |  |  |                                 |

|                                                                       |                  |                      |                                                                                    |
|-----------------------------------------------------------------------|------------------|----------------------|------------------------------------------------------------------------------------|
| AC operated                                                           | Operations       | x<br>10 <sup>6</sup> | 10                                                                                 |
| DC operated                                                           | Operations       | x<br>10 <sup>6</sup> | 10                                                                                 |
| Operating frequency, mechanical                                       |                  |                      |                                                                                    |
| AC operated                                                           | Operations/<br>h |                      | 5000                                                                               |
| DC operated                                                           | Operations/<br>h |                      | 5000                                                                               |
| Climatic proofing                                                     |                  |                      | Damp heat, constant to IEC 60068-2-78<br>Damp heat, cyclic to IEC 60068-2-30       |
| Ambient temperature                                                   |                  | °C                   |                                                                                    |
| Open                                                                  |                  | °C                   | - 25 - 60                                                                          |
| Enclosed                                                              |                  | °C                   | - 25 - 40                                                                          |
| Storage                                                               |                  | °C                   | - 40 - 80                                                                          |
| Mounting position, AC- and DC operated                                |                  |                      |  |
| Mechanical shock resistance (IEC/EN 60068-2-27)                       |                  |                      |                                                                                    |
| Half-sinusoidal shock, 10 ms                                          |                  |                      |                                                                                    |
| Main contacts                                                         |                  |                      |                                                                                    |
| N/O contact                                                           |                  | g                    | 10                                                                                 |
| Auxiliary contacts                                                    |                  |                      |                                                                                    |
| N/O contact                                                           |                  | g                    | 7                                                                                  |
| N/C contact                                                           |                  | g                    | 5                                                                                  |
| Mechanical shock resistance (IEC/EN 60068-2-27) when tabletop-mounted |                  |                      |                                                                                    |
| Half-sinusoidal shock, 10 ms                                          |                  |                      |                                                                                    |
| Main contacts                                                         |                  |                      |                                                                                    |
| N/O contact                                                           |                  | g                    | 5.7                                                                                |
| Auxiliary contacts                                                    |                  |                      |                                                                                    |
| N/O contact                                                           |                  | g                    | 3.4                                                                                |
| N/C contact                                                           |                  | g                    | 3.4                                                                                |
| Protection type                                                       |                  |                      | IP20                                                                               |
| Protection against direct contact when actuated from front (EN 50274) |                  |                      | Finger- and back-of-hand proof                                                     |
| Weight                                                                |                  |                      |                                                                                    |
| AC operated                                                           |                  | kg                   | 0.23                                                                               |
| DC operated                                                           |                  | kg                   | 0.28                                                                               |
| Terminal capacity main cable                                          |                  |                      |                                                                                    |
| Solid                                                                 |                  | mm <sup>2</sup>      | 1 x (0.75 - 4)<br>2 x (0.75 - 2.5)                                                 |
| Flexible with ferrule                                                 |                  | mm <sup>2</sup>      | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5)                                               |
|                                                                       |                  |                      | Also without ferrule.                                                              |
| Solid or stranded                                                     |                  | AWG                  | 18 - 10                                                                            |
| Main cable connection screw/bolt                                      |                  |                      | M3.5                                                                               |
| Tightening torque                                                     |                  | Nm                   | 1.2                                                                                |
| Terminal capacity control circuit cables                              |                  |                      |                                                                                    |
| Solid                                                                 |                  | mm <sup>2</sup>      | 1 x (0.75 - 4)<br>2 x (0.75 - 2.5)                                                 |
| Flexible with ferrule                                                 |                  | mm <sup>2</sup>      | 1 x (0.75 - 1.5)<br>2 x (0.75 - 1.5)                                               |
| Solid or stranded                                                     |                  | AWG                  | 18 - 14                                                                            |
| Control circuit cable connection screw/bolt                           |                  |                      | M3.5                                                                               |
| Tightening torque                                                     |                  | Nm                   | 1.2                                                                                |
| Tool                                                                  |                  |                      |                                                                                    |

|                                          |  |                 |                                      |
|------------------------------------------|--|-----------------|--------------------------------------|
| Main cable                               |  |                 |                                      |
| Pozidriv screwdriver                     |  | Size            | 2                                    |
| Standard screwdriver                     |  | mm              | 0.8 x 5.5<br>1 x 6                   |
| Control circuit cables                   |  |                 |                                      |
| Pozidriv screwdriver                     |  | Size            | 2                                    |
| Standard screwdriver                     |  | mm              | 0.8 x 5.5<br>1 x 6                   |
| Terminal capacity main cable             |  |                 |                                      |
| Solid                                    |  | mm <sup>2</sup> | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5) |
| flexible                                 |  | mm <sup>2</sup> | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5) |
| flexible with ferrules                   |  | mm <sup>2</sup> | 1 x (0.75 - 1.5)<br>2 x (0.75 - 1.5) |
| Solid or stranded                        |  | AWG             | 18 - 14                              |
| Terminal capacity control circuit cables |  |                 |                                      |
| Solid                                    |  | mm <sup>2</sup> | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5) |
| Flexible                                 |  | mm <sup>2</sup> | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5) |
| Flexible with ferrule                    |  | mm <sup>2</sup> | 1 x (0.75 - 1.5)<br>2 x (0.75 - 1.5) |
| Solid or stranded                        |  | AWG             | 18 - 14                              |
| Tool                                     |  |                 |                                      |
| Stripping length                         |  | mm              | 10                                   |
| Screwdriver blade width                  |  | mm              | 3.5                                  |

### Main conducting paths

|                                                     |                  |         |       |
|-----------------------------------------------------|------------------|---------|-------|
| Rated impulse withstand voltage                     | U <sub>imp</sub> | V<br>AC | 8000  |
| Overvoltage category/pollution degree               |                  |         | III/3 |
| Rated insulation voltage                            | U <sub>i</sub>   | V<br>AC | 690   |
| Rated operational voltage                           | U <sub>e</sub>   | V<br>AC | 690   |
| Safe isolation to VDE 0106 Part 101 and Part 101/A1 |                  |         |       |
| between coil and contacts                           |                  | V<br>AC | 400   |
| between the contacts                                |                  | V<br>AC | 400   |
| Making capacity (p.f. to IEC/EN 60947)              |                  |         |       |
|                                                     | Up to 690 V      | A       | 144   |
| Breaking capacity                                   |                  |         |       |
| 220 V 230 V                                         |                  | A       | 120   |
| 380 V 400 V AC                                      |                  | A       | 120   |
| 500 V                                               |                  | A       | 100   |
| 660 690 V AC                                        |                  | A       | 70    |
| Short-circuit rating                                |                  |         |       |
| Short-circuit protection maximum fuse               |                  |         |       |
| Type "2" coordination                               |                  |         |       |
| 400 V                                               | gG/gL<br>500 V   | A       | 20    |
| 690 V                                               | gG/gL<br>690 V   | A       | 20    |
| Type "1" coordination                               |                  |         |       |
| 400 V                                               | gG/gL<br>500 V   | A       | 35    |
| 690 V                                               | gG/gL<br>690 V   | A       | 25    |

### AC

|                           |  |  |  |
|---------------------------|--|--|--|
| AC-1                      |  |  |  |
| Rated operational current |  |  |  |

|                                                           |                |     |     |
|-----------------------------------------------------------|----------------|-----|-----|
| Conventional free air thermal current, 3 pole, 50 - 60 Hz |                |     |     |
| Open                                                      |                |     |     |
| at 40 °C                                                  | $I_{th} = I_e$ | A   | 22  |
| at 50 °C                                                  | $I_{th} = I_e$ | A   | 21  |
| at 55 °C                                                  | $I_{th} = I_e$ | A   | 21  |
| at 60 °C                                                  | $I_{th} = I_e$ | A   | 20  |
| enclosed                                                  | $I_{th}$       | A   | 18  |
| Conventional free air thermal current, 1 pole             |                |     |     |
| open                                                      | $I_{th}$       | A   | 50  |
| enclosed                                                  | $I_{th}$       | A   | 45  |
| AC-3                                                      |                |     |     |
| Rated operational current                                 |                |     |     |
| Open, 3-pole: 50 – 60 Hz                                  |                |     |     |
| 220 V 230 V                                               | $I_e$          | A   | 12  |
| 240 V                                                     | $I_e$          | A   | 12  |
| 380 V 400 V                                               | $I_e$          | A   | 12  |
| 415 V                                                     | $I_e$          | A   | 12  |
| 440V                                                      | $I_e$          | A   | 12  |
| 500 V                                                     | $I_e$          | A   | 10  |
| 660 V 690 V                                               | $I_e$          | A   | 7   |
| Motor rating                                              | P              | kWh |     |
| 220 V 230 V                                               | P              | kW  | 3.5 |
| 240V                                                      | P              | kW  | 4   |
| 380 V 400 V                                               | P              | kW  | 5.5 |
| 415 V                                                     | P              | kW  | 7   |
| 440 V                                                     | P              | kW  | 7.5 |
| 500 V                                                     | P              | kW  | 7   |
| 660 V 690 V                                               | P              | kW  | 6.5 |
| AC-4                                                      |                |     |     |
| Open, 3-pole: 50 – 60 Hz                                  |                |     |     |
| 230 V                                                     | $I_e$          | A   | 7   |
| 240 V                                                     | $I_e$          | A   | 7   |
| 400 V                                                     | $I_e$          | A   | 7   |
| 415 V                                                     | $I_e$          | A   | 7   |
| 440 V                                                     | $I_e$          | A   | 7   |
| 500 V                                                     | $I_e$          | A   | 6   |
| 690 V                                                     | $I_e$          | A   | 5   |
| Motor rating                                              | P              | kWh |     |
| 230 V                                                     | P              | kW  | 2   |
| 240 V                                                     | P              | kW  | 2.2 |
| 400 V                                                     | P              | kW  | 3   |
| 415 V                                                     | P              | kW  | 3.4 |
| 440 V                                                     | P              | kW  | 3.6 |
| 500 V                                                     | P              | kW  | 3.5 |
| 690 V                                                     | P              | kW  | 4.4 |

## DC

|                                 |       |   |     |
|---------------------------------|-------|---|-----|
| Rated operational current, open |       |   |     |
| DC-1                            |       |   |     |
| 60 V                            | $I_e$ | A | 20  |
| 110 V                           | $I_e$ | A | 20  |
| 220 V                           | $I_e$ | A | 15  |
| 440 V                           | $I_e$ | A | 1.3 |
| DC-3                            |       |   |     |

|       |                |   |     |
|-------|----------------|---|-----|
| 60 V  | I <sub>e</sub> | A | 20  |
| 110 V | I <sub>e</sub> | A | 20  |
| 220 V | I <sub>e</sub> | A | 1.5 |
| 440 V | I <sub>e</sub> | A | 0.2 |
| DC-5  |                |   |     |
| 60 V  | I <sub>e</sub> | A | 20  |
| 110 V | I <sub>e</sub> | A | 20  |
| 220 V | I <sub>e</sub> | A | 1.5 |
| 440 V | I <sub>e</sub> | A | 0.2 |

### Current heat loss

|                                                   |  |    |     |
|---------------------------------------------------|--|----|-----|
| 3-pole at I <sub>th</sub>                         |  | W  | 3   |
| Current heat loss at I <sub>e</sub> to AC-3/400 V |  | W  | 1.1 |
| Impedance per pole                                |  | mΩ | 2.5 |

### Magnet systems

|                                                                        |          |                  |                                                                                     |
|------------------------------------------------------------------------|----------|------------------|-------------------------------------------------------------------------------------|
| Voltage tolerance                                                      |          | x U <sub>c</sub> |                                                                                     |
| AC operated                                                            | Pick-up  | x U <sub>c</sub> | 0.8 - 1.1                                                                           |
| Drop-out voltage AC operated                                           | Drop-out | x U <sub>c</sub> | 0.3 - 0.6                                                                           |
| DC operated                                                            | Pick-up  | x U <sub>c</sub> | 0.7 - 1.2                                                                           |
| Notes                                                                  |          |                  | at least smoothed two-phase bridge rectifier or three-phase rectifier               |
| DC operated                                                            | Drop-out | x U <sub>c</sub> | 0.15 - 0.6                                                                          |
| Power consumption of the coil in a cold state and 1.0 x U <sub>c</sub> |          |                  |                                                                                     |
| 50 Hz                                                                  | Pick-up  | VA               | 24                                                                                  |
| 50 Hz                                                                  | Sealing  | VA               | 3.4                                                                                 |
| 50 Hz                                                                  | Sealing  | W                | 1.2                                                                                 |
| 60 Hz                                                                  | Pick-up  | VA               | 30                                                                                  |
| 60 Hz                                                                  | Sealing  | VA               | 4.4                                                                                 |
| 60 Hz                                                                  | Sealing  | W                | 1.4                                                                                 |
| 50/60 Hz                                                               | Pick-up  | VA               | 27<br>25                                                                            |
| 50/60 Hz                                                               | Sealing  | VA               | 4.2<br>3.3                                                                          |
| 50/60 Hz                                                               | Sealing  | W                | 1.4<br>1.2                                                                          |
| DC operated                                                            | Pick-up  | W                | 4.5                                                                                 |
| DC operated                                                            | Sealing  | W                | 4.5                                                                                 |
| Duty factor                                                            |          | %<br>DF          | 100                                                                                 |
| Switching times at 100 % U <sub>c</sub> (approximate values)           |          |                  |                                                                                     |
| Main contacts                                                          |          |                  |                                                                                     |
| AC operated                                                            |          |                  |                                                                                     |
| Closing delay                                                          |          | ms               | 15 - 21                                                                             |
| Opening delay                                                          |          | ms               | 9 - 18                                                                              |
| DC operated                                                            |          | ms               |                                                                                     |
| Closing delay                                                          |          | ms               | 31                                                                                  |
| Opening delay                                                          |          | ms               | 12                                                                                  |
| Arcing time                                                            |          | ms               | 10                                                                                  |
| Lifespan, mechanical; Coil 50/60 Hz                                    | at 50 Hz |                  | Mechanical lifespan at 50 Hz approx. 30% lower than under "Technical data, general" |

### Electromagnetic compatibility (EMC)

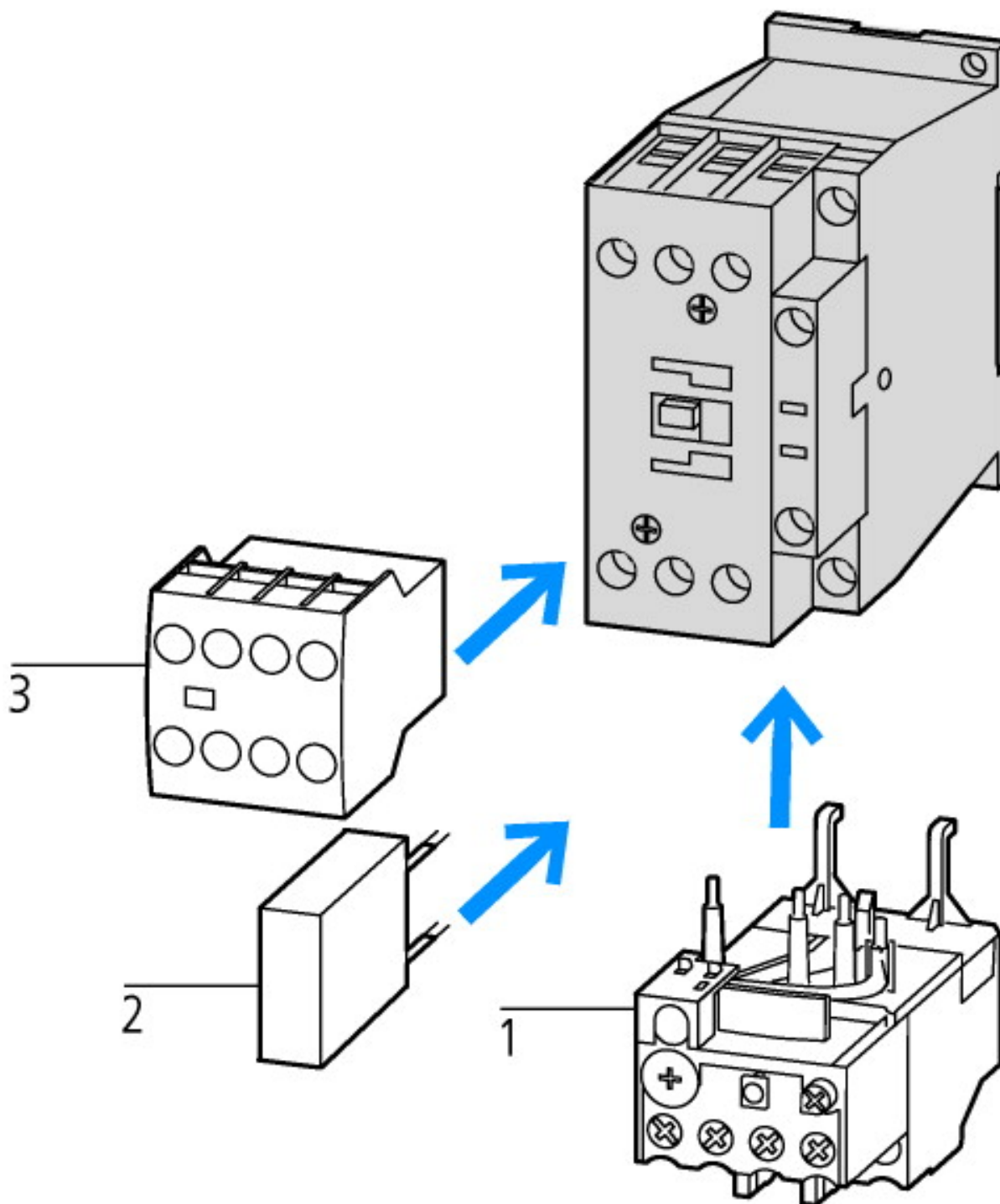
|                       |  |  |               |
|-----------------------|--|--|---------------|
| Emitted interference  |  |  | to EN 60947-1 |
| Interference immunity |  |  | to EN 60947-1 |

### Technical data ETIM 4.0

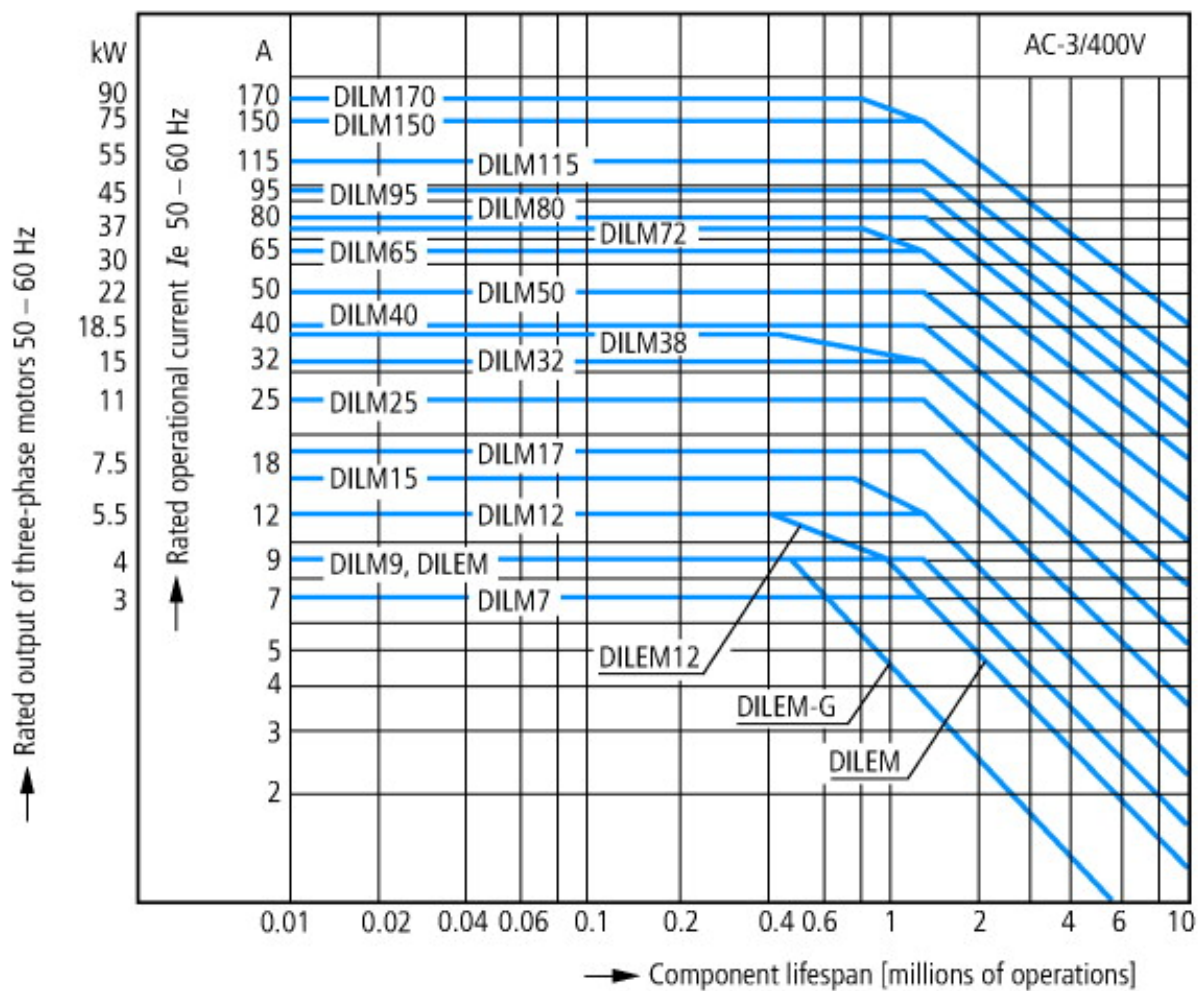
|                                                       |  |   |                  |
|-------------------------------------------------------|--|---|------------------|
| Number of main contacts as N/Os                       |  |   | 3                |
| Rated operation current I <sub>e</sub> at AC-1, 400 V |  |   | 14               |
| Connection type main circuit                          |  |   | Screw connection |
| Rated control voltage U <sub>s</sub> at AC 60HZ       |  | V | 110              |

|                                              |     |     |
|----------------------------------------------|-----|-----|
| Number of auxiliary contacts as N/Os         |     | 1   |
| Rated control voltage $U_s$ at AC 50HZ       | V   | 110 |
| Number of auxiliary contacts as N/Cs         |     | 0   |
| Suitable for rail-mounting                   |     | No  |
| Rated control voltage $U_s$ at DC            | V   | 0   |
| Voltage type for actuation                   |     | AC  |
| Rated operation current $I_e$ at AC-3, 400 V | A   | 12  |
| Number of N/Cs as main contact               |     | 0   |
| Motor rating at AC-3, 400 V                  | kWh | 5.5 |

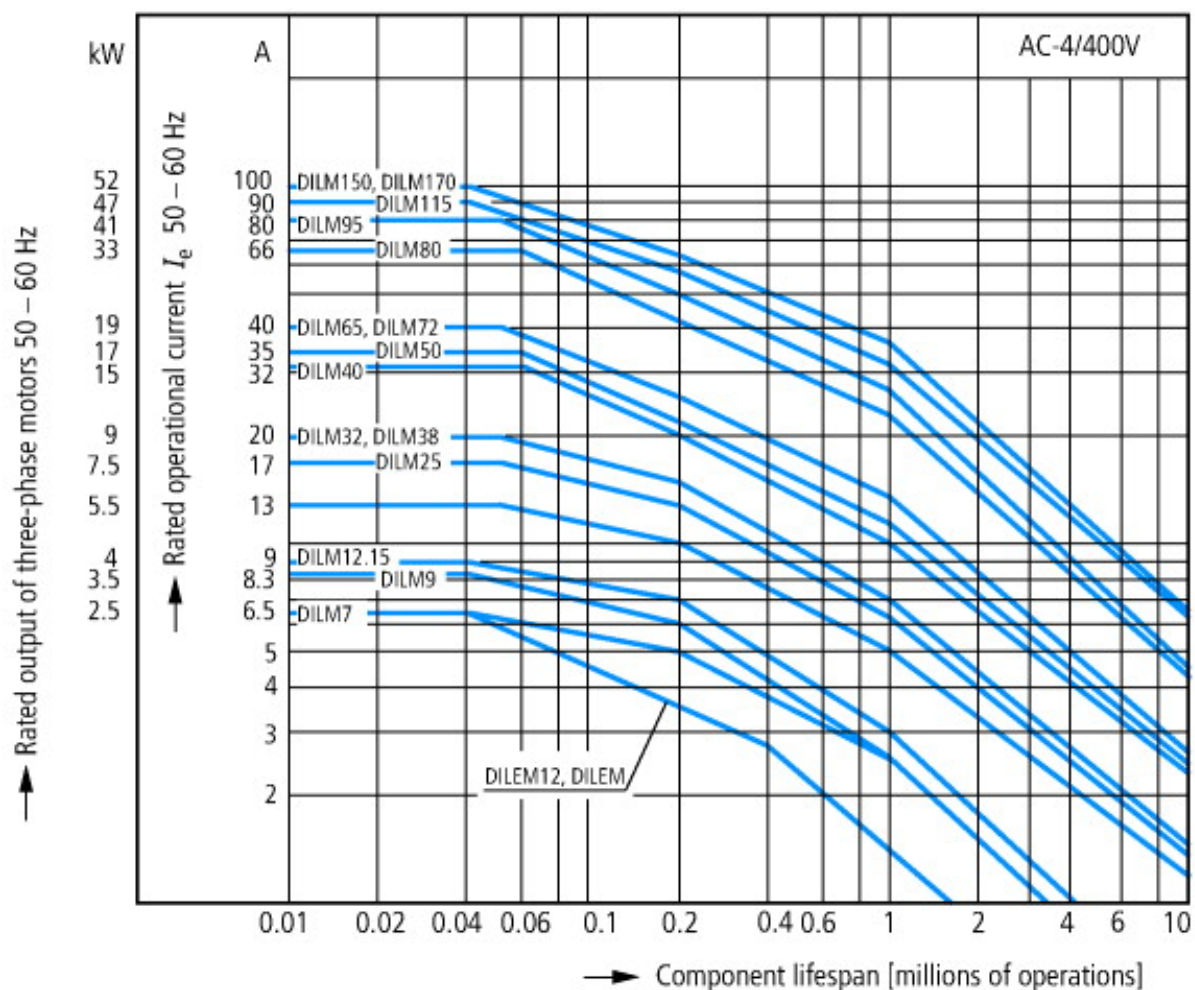
## Characteristics



- 1: Overload relay
- 2: Suppressor
- 3: Auxiliary contact modules



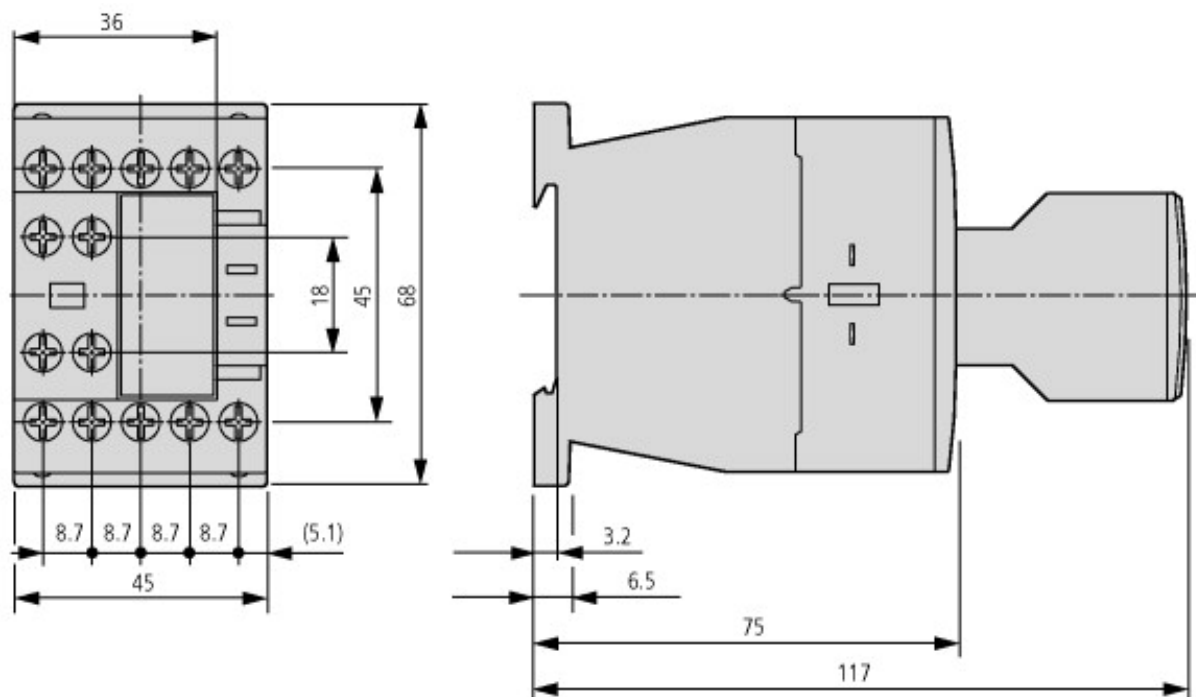
Squirrel-cage motor  
 Operating characteristics  
 Starting: from rest  
 Stopping: after attaining full running speed  
 Electrical characteristics  
 Make: up to 6 x rated motor current  
 Break: up to 1 x rated motor current  
 Utilization category  
 100 % AC-3  
 Typical applications  
 Compressors  
 Lifts  
 Mixers  
 Pumps  
 Escalators  
 Agitators  
 Fans  
 Conveyor belts  
 Centrifuges  
 Hinged flaps  
 Bucket-elevators  
 Air conditioning system  
 General drives in manufacturing and processing machines



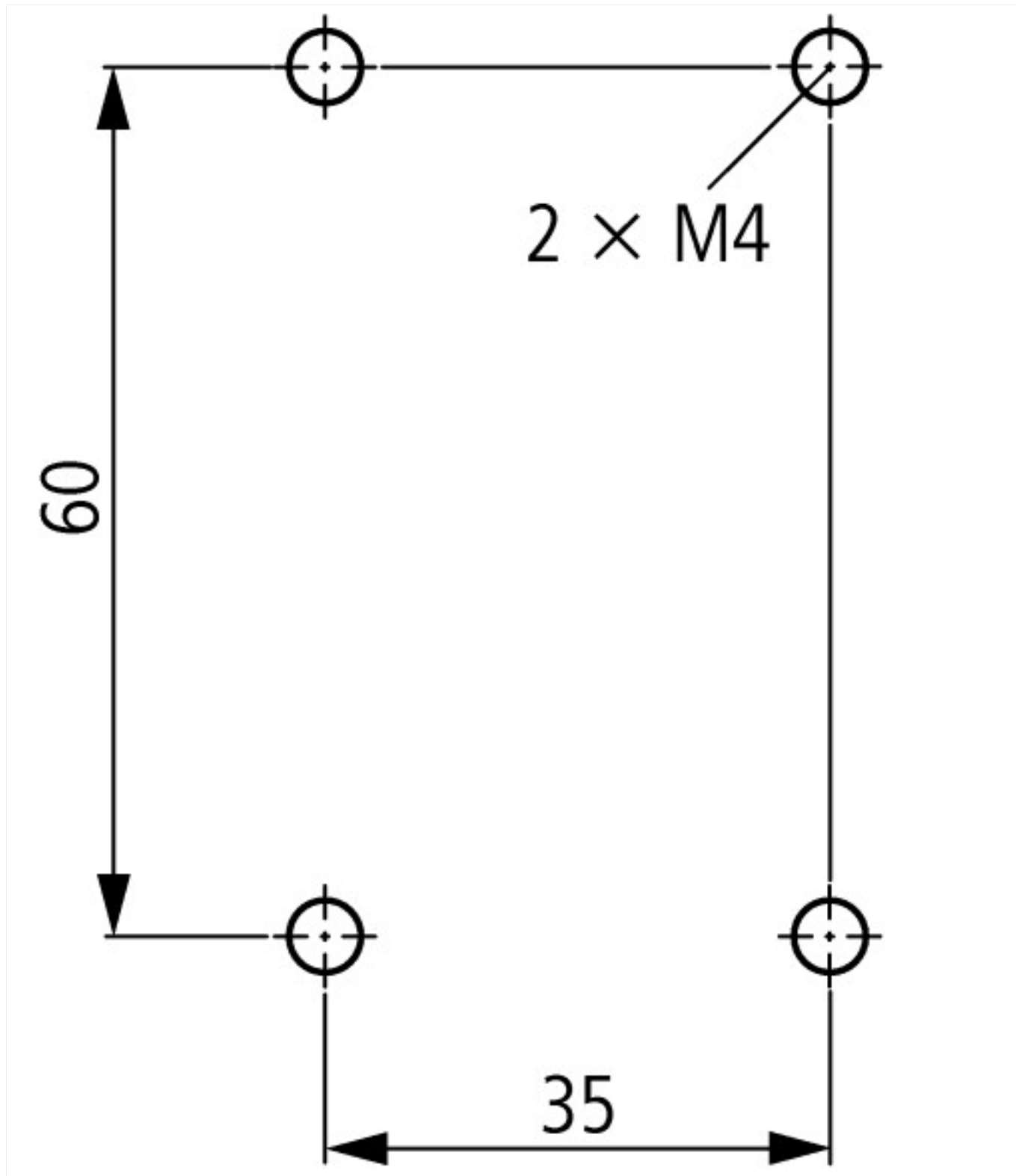
Extreme switching duty  
 Squirrel-cage motor  
 Operating characteristics  
 Inching, plugging, reversing  
 Electrical characteristics  
 Make: up to 6 x rated motor current  
 Break: up to 6 x rated motor current  
 Utilization category  
 100 % AC-4  
 Typical applications  
 Printing presses  
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

## Dimensions





Contactor with auxiliary contact module



#### Additional product information (links)

|                                                                                                                                                           |                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IL03407013Z (AWA2100-2126) Contactors</b>                                                                                                              |                                                                                                                                                                       |
| IL03407013Z (AWA2100-2126)<br>Contactors                                                                                                                  | <a href="ftp://ftp.moeller.net/DOCUMENTATION/AWA_INSTRUCTIONS/IL03407013Z2012_03.pdf">ftp://ftp.moeller.net/DOCUMENTATION/AWA_INSTRUCTIONS/IL03407013Z2012_03.pdf</a> |
| <a href="http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.84">http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.84</a> |                                                                                                                                                                       |
| <a href="http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.85">http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.85</a> |                                                                                                                                                                       |
| <a href="http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.86">http://de.ecat.moeller.net/flip-cat/?edition=HPLTE&amp;startpage=5.86</a> |                                                                                                                                                                       |
| Switchgear of Power Factor Correction Systems                                                                                                             | <a href="http://www.moeller.net/binary/ver_techpapers/ver934en.pdf">http://www.moeller.net/binary/ver_techpapers/ver934en.pdf</a>                                     |
| X-Start - New Generation:100 years of Moeller contactors - Continuous Progress-                                                                           | <a href="http://www.moeller.net/binary/ver_techpapers/ver937en.pdf">http://www.moeller.net/binary/ver_techpapers/ver937en.pdf</a>                                     |
| X-Start - Modern Switching Installations Efficiently Fitted and Wired Securely                                                                            | <a href="http://www.moeller.net/binary/ver_techpapers/ver938en.pdf">http://www.moeller.net/binary/ver_techpapers/ver938en.pdf</a>                                     |

|                                                                                                |                                                                                                                                   |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Mirror Contacts for Highly-Reliable Information Relating to Safety-Related Control Functions   | <a href="http://www.moeller.net/binary/ver_techpapers/ver944en.pdf">http://www.moeller.net/binary/ver_techpapers/ver944en.pdf</a> |
| Effect of the Cable Capacitance of Long Control Cables on the Actuation of Contactors          | <a href="http://www.moeller.net/binary/ver_techpapers/ver949en.pdf">http://www.moeller.net/binary/ver_techpapers/ver949en.pdf</a> |
| Motor starters and "Special Purpose Ratings" for the North American market                     | <a href="http://www.moeller.net/binary/ver_techpapers/ver953en.pdf">http://www.moeller.net/binary/ver_techpapers/ver953en.pdf</a> |
| Switchgear for Luminaires                                                                      | <a href="http://www.moeller.net/binary/ver_techpapers/ver955en.pdf">http://www.moeller.net/binary/ver_techpapers/ver955en.pdf</a> |
| Standard Compliant and Functionally Safe Engineering Design with Mechanical Auxiliary Contacts | <a href="http://www.moeller.net/binary/ver_techpapers/ver956en.pdf">http://www.moeller.net/binary/ver_techpapers/ver956en.pdf</a> |
| The Interaction of Contactors with PLCs                                                        | <a href="http://www.moeller.net/binary/ver_techpapers/ver957en.pdf">http://www.moeller.net/binary/ver_techpapers/ver957en.pdf</a> |
| Busbar Component Adapters for modern Industrial control panels                                 | <a href="http://www.moeller.net/binary/ver_techpapers/ver960en.pdf">http://www.moeller.net/binary/ver_techpapers/ver960en.pdf</a> |