

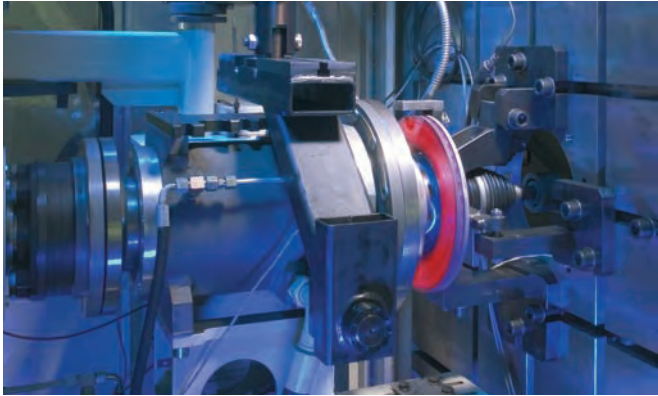
Contactors DIL: Efficient Solutions for the Motor Feeder

xStart



The identifier for the new contactor generation is the green print. The innovations are already partly known as they have been integrated into the series on an ongoing basis over the last few years. The contactors up to 15.5 A have been extended with plug-in accessories such as motor filters and solder pin adapters. Motor starters in the size range can also be plugged-in. The necessary openings have been perfectly enclosed just as the entire contactor to assure perfect operation. An even higher level of operational safety is now guaranteed by the new knurled contacts for the auxiliary contacts.

The contactors are becoming more efficient, particularly due to the new Eco types for 15.5, 38, 72 and 170 A, as well as through the many innovations with the motor starters, for example, such as SmartWire.



Safety

Continuous operation requires the components used to have a high level of operational reliability. That's why contactors DIL M offer not only offer high lifespan values for standard AC-3 operation, but are also ideally suited for demanding AC-4 motor inching applications. This increases safety even when machines and plants are being reset or refitted. Active safety features are inherent in these devices: interlocked opposing contacts, isolation and protection against direct contact are standard.

Economy worldwide

Machine and panel builders alike are looking for economical solutions for low-voltage switchgear assemblies. The contactors DIL M and overload relays ZB are ideal for integrating in complete systems, thus enabling considerable cost savings. In many places, coupling levels are completely unnecessary since intelligent electronics take over this task. The low pick-up and sealing power means that smaller transformers can be used.



Contactors DIL M

With the same dimensions for AC and DC contactors, planning and engineering can be carried out with even greater efficiency. With only four component sizes covering the rating range up to 170 A, engineering is made even simpler.

A key benefit with contactors up to 38 A is that the auxiliary contact is already built in, and the DC contactors include a suppressor circuit up to 170 A. From 15 A, the DC contactors have an electronic drive that removes the need for coupling relays. With all these extras already included in the contactors, your costs are clearly reduced.

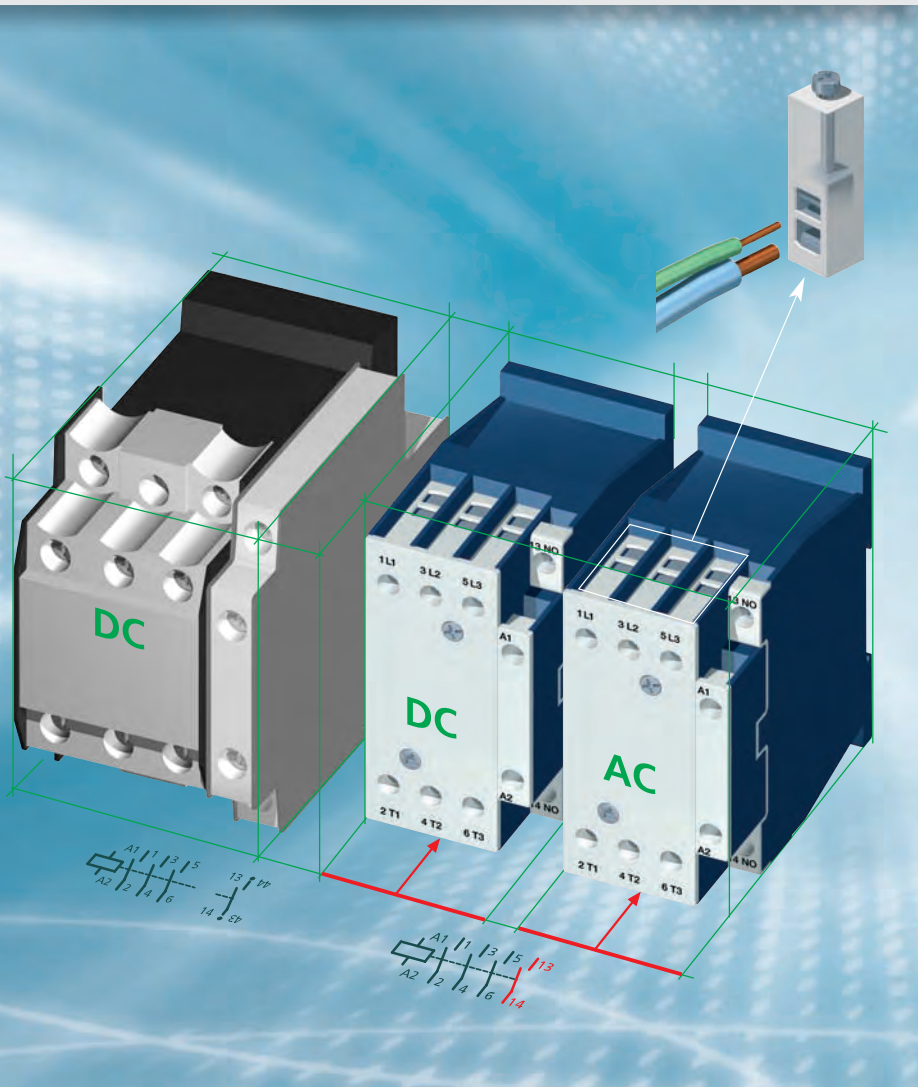
Contactor relays DIL A

The new auxiliary contacts DIL A perfectly complement the new motor contactors DIL M. A wide range of auxiliary contacts specially designed for the contactor relays ensures optimum solutions and reliable identification.

ZB overload relays

Overloads relays ZB protect the motor against phase failure or overload. Their auxiliary contacts switch the motor contactor off, and signal the fault. These relays are suitable for protecting EEx e-motors according to the ATEX 100 a guideline.

AC and DC Contactors: With Same Frame Size – For Simpler Engineering



The new contactors DIL M are significantly more compact than their predecessors, even though, up to 32 A, the auxiliary contact is included. The advantage of this is particularly striking with the DC contactors that now are the same size as their AC counterparts. This makes everything easier, i.e. planning, engineering and fitting, without having to alter the control system, even if the control current has to change for another customer. The same range of accessories are used both for AC and DC actuators contactors.

No compromise where termination reliability is concerned

DIL contactors up to 150 A have box terminals with two clamping chambers, allowing unequal cable cross-sections to be terminated absolutely securely. This makes wiring easier and cuts down on associated errors.

Speedier wiring using spring-loaded terminations



Moeller provides proven quality with tension clamp terminals. Numerous tests have proved that contactors and motor-protective circuit-breakers are just as securely wired in this way as by screw connection – even in strongly vibrating machines. But wiring work using tension clamp terminals is very much quicker to do. The main current paths on PKZM 0 and motor contactors up to 12 A all use spring-loaded terminals. The sundries for termination are always available for both screw and tension clamp connection.



The new electronic timer modules DIL M32-XTE are connected to the front of the new contactors DIL M7 to DIL M32, DIL MP20 and DIL A. Thus a simple contactor control with a timer function can be created which does not require a higher level PLC, or for cases where a PLC would be uneconomical. The on-delayed, off-delayed and star-delta functions allow a large range of applications.



This reduces the cost of your control panel

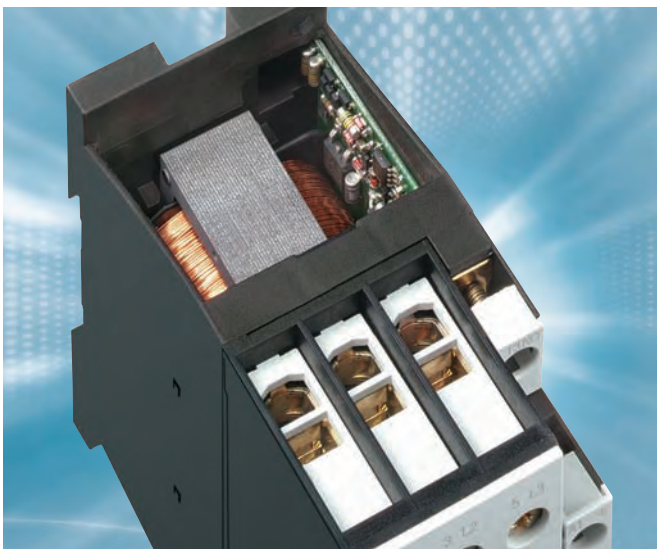
The space-saving is achieved not just by the reduced component dimensions, but also due to the lower heat dissipation that, particularly with the DC contactors, helps keep the cabinet size down and saves the cost of a fan. The significantly reduced sealing consumption achieved by innovative, electronic drives makes this possible. The Moeller DC contactors from 17 up to 65 A have a sealing consumption of only 0.5 Watt, even those at 170 A only use 2.1 Watt. This also results in lower power consumption for the whole installation.



Electronic-compatible auxiliary contact

Often very small signals have to be switched for indicating the state of the contactor to the PLC. In order to increase the of the feedback signal Moeller has developed a new auxiliary contact with a make and break contact which is suitable for switching small currents with low voltages. The DILA-XHIR1 auxiliary contact is tested for contact reliability at 1mA and 17VDC. The failure rate is less than 1 failure in 100 million switching operations.

The auxiliary break contact is designed as a mirror contact so that it can be used in safety applications as feedback signal.



The benefits of the electronically controlled drive

All DC motor contactors with DC actuation from DIL M17 have an electronically controlled drive that offers the following advantages:

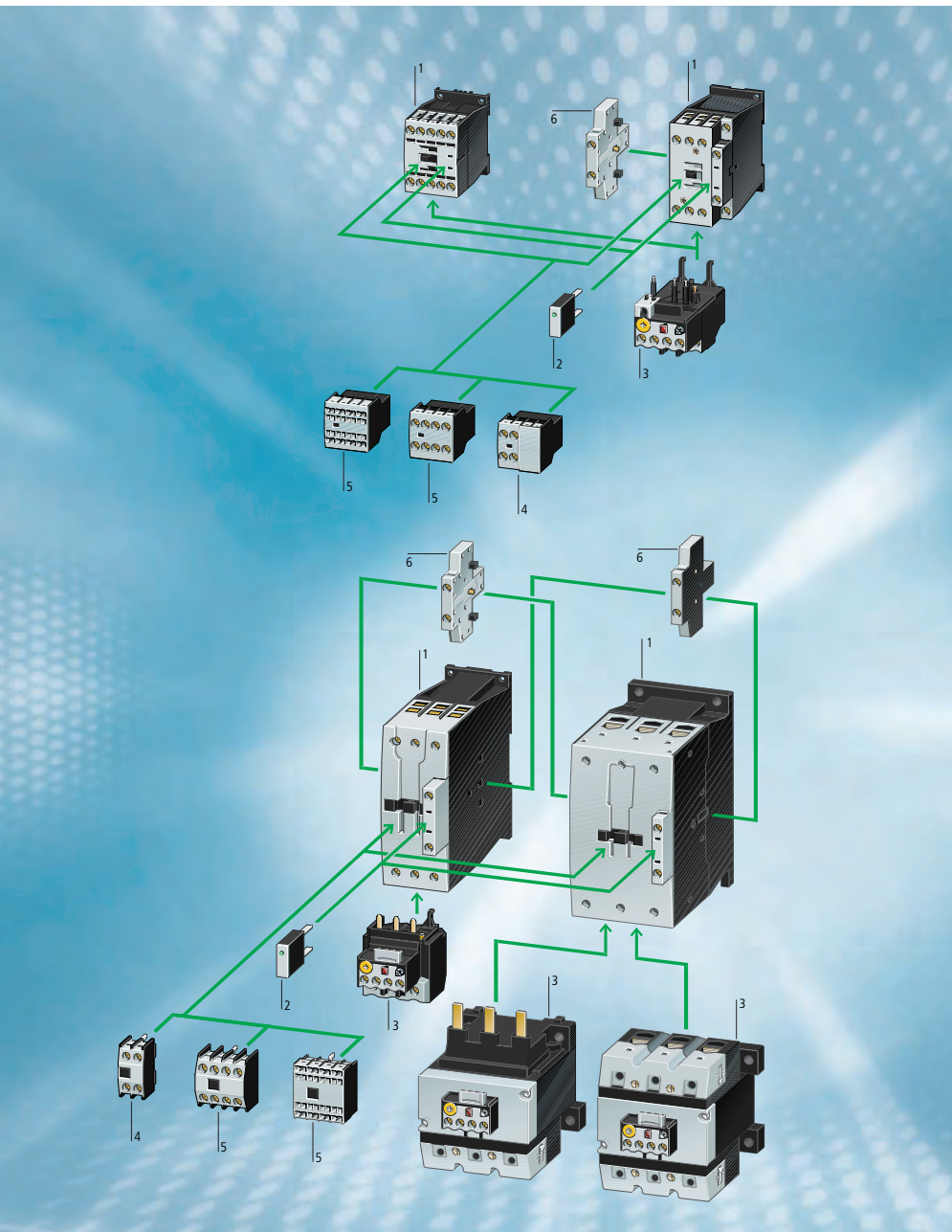
- Significantly less heat dissipation due to reduced sealing consumption
- Smaller control transformers because of lower pick-up consumption
- Direct actuation from the PLC without coupling contactors up to 32 A



Switching contactors directly from the PLC

This is a feature that is becoming increasingly more popular and is primarily made possible by the limitation of the DC pick-up power. Moeller's new contactors DIL M up to 32 A can be switched directly from the PLC using 0.5 A DC outputs. An additional coupling relay thus becomes unnecessary, and this also applies to expensive and cumbersome relay outputs. The new contactors DIL M thus enable the use of more compact switching cabinets and inexpensive solutions.

Simply Select: Contactors DIL M:



1. Contactors up to 90 kW
2. Suppressor¹
3. Overload relays
4. Auxiliary contact modules, 2-pole
5. Auxiliary contact modules, 4-pole
6. Side-mounted auxiliary contact modules, 2-pole

Contactor, 3-pole

AC-3
380 V/ 400 V

AC 230 V 50 HZ 240 V 60 Hz,
110 V 50 HZ 120 V 60 Hz,
24 V 50/60 HZ,
DC 24 V

I_e A	P kW	Contacts	Part no. <small>Add voltages from above</small>
7	3	1N/O	DILM7-10 (...)
7	3	1N/C	DILM7-01(...)
9	4	1N/O	DILM9-10 (...)
9	4	1N/C	DILM9-01 (...)
12	5.5	1N/O	DILM12-10 (...)
12	5.5	1N/C	DILM12-01 (...)
15.5	7.5	1N/O	DILM15-10 (...)
15.5	7.5	1N/C	DILM15-01 (...)
18	7.5	1N/O	DILM17-10 (...)
18	7.5	1N/C	DILM17-01 (...)
25	11	1N/O	DILM25-10 (...)
25	11	1N/C	DILM25-01 (...)
32	15	1N/O	DILM32-10 (...)
32	15	1N/C	DILM32-01 (...)
40	18.5	–	DILM40 (...)
50	22	–	DILM50 (...)
65	30	–	DILM65 (...)
72	37	–	DILM72 (...)
80	37	–	DILM80 (...)
95	45	–	DILM95 (...)
115	55	–	DILM115 (...) ¹
150	75	–	DILM150 (...) ¹
170	90	–	DILM170 (...) ¹

¹ DILM 115, DILM 150, DILM 170
suppressor circuit also not required with the AC version



<http://www.moeller.net/xstart>



Auxiliary contact		Overload relay		Suppressor ¹			Electronic timer modules	
AC 15, 380 V 400 V 415 V		Setting range, Overload release			Varistor suppressor * with LED	RC suppressor	RAC240 = 200-240V AC RAC130 = 100-130V AC RA24 = 24V AC/DC	
Contacts	Part no.	I_r A	Part no.	U_s V AC	Part no.	Part no.	Time ranges	Supplement part no. DILM32-XTE...
1N/O 1N/C – 2N/C	DILM 32-XHI11 ² DILM 32-XHI02 ²	0.1-0.16 0.16-0.24	ZB12-0,16 ZB12-0,24	24-48	DILM12-XSPV48 DILM12-XSPVL48*	DILM12-XSPR48	on-delayed 0.05 s - 100 s	E11-100 (RA24) E11-100 (RAC130) E11-100 (RAC240)
2N/O 2N/C	DILM 32-XHI22 ²	0.24-0.4	ZB12-0,4	48-130	DILM12-XSPV130	DILM12-XSPR240	0.05 s - 100 s	
2N/O –	DILA-XHI20	0.4-0.6	ZB12-0,6	130-240	DILM12-XSPV240		0.05 s - 100 s	
1N/O 1N/C	DILA-XHI11	0.6-1	ZB12-1,0		DILM12-XSPVL240*			
– 2N/C	DILA-XHI02	1-1.6	ZB12-1,6	240-500	DILM12-XSPV500	DILM12-XSPR500	off-delayed 0.05 s - 1 s	D11-1 (RA24)
1N/O 1N/C	DILA-XHIV11	1.6-2.4	ZB12-2,4				0.5 s - 10 s	D11-10 (RA24)
4N/O –	DILA-XHI40	2.4-4	ZB12-4				5 s - 100 s	D11-100 (RA24)
3N/O 1N/C	DILA-XHI31	4-6	ZB12-6					
2N/O 2N/C	DILA-XHI22	6-10	ZB12-10					
1N/O 3N/C	DILA-XHI13	9-12	ZB12-12				0.05 s - 1 s	D11-1 (RAC130)
– 4N/C	DILA-XHI04	12-16	ZB12-16				0.5 s - 10 s	D11-10 (RAC130)
2N/O 2N/C	DILA-XHIV22						5 s - 100 s	D11-100 (RAC130)
2N/O –	DILA-XHIT20 ³	0.1-0.16	ZB32-0,16	24-48	DILM32-XSPV48	DILM32-XSPR48	0.05 s - 1 s	D11-1 (RAC240)
1N/O 1N/C	DILA-XHIT11 ³	0.16-0.24	ZB32-0,24	48-130	DILM32-XSPVL48*		0.5 s - 10 s	D11-10 (RAC240)
– 2N/C	DILA-XHIT02 ³	0.24-0.4	ZB32-0,4	130-240	DILM32-XSPV130	DILM32-XSPR240	5 s - 100 s	D11-100 (RAC240)
2N/O 2N/C	DILA-XHIT22 ³	0.4-0.6	ZB32-0,6		DILM32-XSPV240			
1N/O 1N/C	DILA-XHIR11 ⁴	0.6-1	ZB32-1,0		DILM32-XSPVL240*			
1N/O 1N/C	DILM32-XHI11-S ⁵	1-1.6	ZB32-1,6	240-500	DILM32-XSPV500	DILM32-XSPR500	star-delta 1 s - 30 s switch-over delay 50 ms	Y20 (RA24) Y20 (RAC130) Y20 (RAC240)
		1.6-2.4	ZB32-2,4					
		2.4-4	ZB32-4					
		4-6	ZB32-6					
		6-10	ZB32-10					
		10-16	ZB32-16					
		16-24	ZB32-24					
		24-32	ZB32-32					
2N/O –	DILM150-XHI20	6-10	ZB65-10	24-48	DILM95-XSPV48	DILM95-XSPR48		
1N/O 1N/C	DILM150-XHI11	10-16	ZB65-16	48-130	DILM95-XSPVL48*			
– 2N/C	DILM150-XHI02	16-24	ZB65-24	130-240	DILM95-XSPV130	DILM95-XSPR24		
4N/O –	DILM150-XHI40	24-40	ZB65-40		DILM95-XSPV240			
3N/O 1N/C	DILM150-XHI31	40-57	ZB65-57		DILM95-XSPVL240*			
2N/O 2N/C	DILM150-XHI22	57-65	ZB65-65	240-500	DILM95-XSPV500	DILM95-XSPR50		
1N/O 3N/C	DILM150-XHI13							
– 4N/C	DILM150-XHI04	25-35	ZB150-35	24-48	DILM95-XSPV48	DILM95-XSPR48		
2N/O 2N/C	DILM150-XHIV22	35-50	ZB150-50	48-130	DILM95-XSPVL48*			
1N/O 1N/C	DILM150-XHI11-SI	50-70	ZB150-70	130-240	DILM95-XSPV130	DILM95-XSPR240		
1N/O 1N/C	DILM150-XHIA11	70-100	ZB150-100		DILM95-XSPV240			
		95-125	ZB150-125		DILM95-XSPVL240*			
		120-142	ZB150-150	240-500	DILM95-XSPV500	DILM95-XSPR500		

² cannot be combined with DIL M-01

³ high version

⁴ suitable for electronic applications

⁵ side-mounted auxiliary contact modules only for DILM 17, 25, 32, can only be installed on left, cannot be combined with top mounting auxiliary contacts or mechanical interlocks

UL/CSA see page 124

Simply Select: Contactor Relays DIL A, Mini Contactor Relays DIL E



Contactor relays DIL A		Auxiliary contact modules DIL A		Note
AC 15, 380 V 415 V I_e 4 A	AC 230 V 50 HZ 240 V 60 Hz, 110 V 50 HZ 120 V 60 Hz, DC 24 V	AC 15, 380 V / 400 V / 415 V I_e 4 A		<p>The listed auxiliary contacts are available with springloaded terminals.</p> <p>The auxiliary contact modules listed for the contactor relay DIL A can also be used for the contactors DIL M up to 32 A.</p> <p>Auxiliary contact members: DILA-XHI to EN 50005, DILM32-XHI to DIN 50012</p> <p>The contactor relay DILA-22 can not be combined with the 4-pole auxiliary contact module. For use with tool-less plug connection we recommend the auxiliary contact DILA-XHIT... in the high version.</p>
Contacts	Part no. Add voltages from above	Contacts	Part no.	
4N/O 3N/O 1N/C 2N/O 2N/C	DILA40(...) DILA31(...) DILA22(...)	- 2N/C 1N/O 1N/C 2N/O - 1N/O 1N/C - 4N/C 1N/O 3N/C 2N/O 2N/C 3N/O 1N/C 4N/O - 2N/O 2N/C 2N/O - 1N/O 1N/C - 2N/C 2N/O 2N/C	DILA-XHI02 DILA-XHI11 DILA-XHI20 DILA-XHIV11 DILA-XHI04 DILA-XHI13 DILA-XHI22 DILA-XHI31 DILA-XHI40 DILA-XHIV22 DILA-XHIT20 DILA-XHIT11 DILA-XHIT02 DILA-XHIT22	

Thermistor overload relay EMT6

Remarkable functional versatility in the smallest possible space the EMT 6 thermistor overload relay protects machines against overtemperatures during severe starting duty, braking duty, undervoltage and overvoltage, and high switching frequency. The temperature is monitored by means of a thermistor, directly on the motor winding. In the event of overtemperature, the appropriate signal is passed to the EMT 6. It trips, and the fault is clearly displayed in the control panel. Another field of application for the EMT 6 is the monitoring of temperatures in bearings, gearboxes, oils and coolants.

Universal and economical

Three types with differing functions are available: EMT6, EMT6-DB, EMT6-DBK. The EMT 6-DBK is the most versatile with functions such as automatic or manual operation, recognition of short circuits in the sensor circuit and zero-voltage safety.



Zero-voltage safety ensures reliable fault signalling even in the event of supply voltage failure; signalling which helps prevent expensive downtimes. The multivoltage module automatically adapts to all conventional control voltages from 24 V DC to 240 V AC.



Mini contactor relays DIL EM ¹				Mini contactor relays DIL ER ¹		Auxiliary contact modules ¹		Overload relays ZE	
AC-3 380 V / 400 V		AC 230 V 50 Hz 240 V 60 Hz,		AC 15, 380 V / 400 V / 415 V I_e 3A		AC 15, 380 V / 400 V / 415 V I_e 2A		Setting range, overload release	
I_e	P	Contacts	Part no.	Contacts	Part no.	Contacts	Part no.	I_r	Part no.
A	kW		Add voltages from above					A	
6.6	3	1N/O -	DILEEM-10(...)	4N/O -	DILER-40(...)	- 2N/C	02DILEM	0.1 - 0.16	ZE-0,16
6.6	3	- 1N/C	DILEEM-01(...)	3N/O 1N/C	DILER-31(...)	1N/O 1N/C	11DILEM	0.16 - 0.24	ZE-0,24
8.8	4	1N/O -	DILEM-10(...)	2N/O 2N/C	DILER-22(...)	2N/O 2N/C	22DILEM	0.24 - 0.4	ZE-0,4
8.8	4	- 1N/C	DILEM-01(...)			- 2N/C	02DILE	0.4 - 0.6	ZE-0,6
						1N/O 1N/C	11DILE	0.6 - 1	ZE-1,0
						2N/O -	20DILE	1.6 - 2.4	ZE-2,4
						1N/O 1N/C	11DDILE	2.4 - 4	ZE-4
						- 4N/C	04DILE	4 - 6	ZE-6
						1N/O 3N/C	13DILE	6 - 9	ZE-9
						2N/O 2N/C	22DILE		
						3N/O 1N/C	31DILE		
						4N/O -	40DILE		
						2N/O 2N/C	22DDILE		

¹ The auxiliary and main contacts listed are available with spring-loaded terminals.

UL/CSA see page 124

Thermistor relay for machine protection EMT6

Basic functions: thermistor protection, autoreset, diagnostics LEDs

Functions	Part no.
Basic functions	24-240V DC/AC 230 V AC EMT6 EMT6 (230V)
Basic functions + short-circuit recognition in the sensor circuit	230V AC EMT6-K
Basic functions + manual/autoreset + remote reset + test function + error memory	24-240V DC/AC 230V AC EMT6-DB EMT6-DB (230V)
Basic functions + manual/autoreset + remote reset + test function + error memory + short-circuit recognition in the sensor circuit	24-240V DC/AC EMT6-KDB
Basic functions + manual/autoreset + remote reset + test function + error memory + short-circuit recognition in the sensor circuit (disconnectable) + zero-voltage safety (disconnectable)	24-240V DC/AC EMT6-DBK

DILMP Four-Pole Contactors



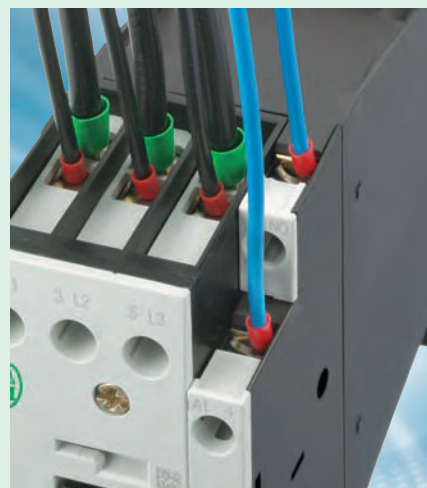
Combination plug connections



These combinations always consist of universal standard components which offer a constantly high level of quality at an attractive price due to the large production volumes involved. With contactors < 16 A DIL M12-XSL or DIL M12-XRL star-delta and reversing starter wiring kits can be fitted in the plug connectors rapidly and with optimum space saving.

4-pole contactor		
AC-1 Conventional free air thermal current Open		AC 230 V 50 HZ 240 V 60 Hz, o.RAC240 ¹ , 110 V 50 HZ 120 V 60 Hz, 24 V 50/60 Hz, DC 24 VDC or RDC24 ²
$I_{th}=I_e$ A	N/O N/C	Part No. Add voltage from above
20	–	DILMP20 (...)
32 45	1N/O 1N/O	DILMP32-10 (...) DILMP45-10 (...)
63 80	– –	DILMP63 (...) DILMP80 (...)
125 160 200	– – –	DILMP125 (...) DILMP160 (...) DILMP200 (...)

Wiring



The coil terminals are now arranged at the front of the contactors. As they are no longer covered by main current wiring that is often rigid, this simplifies and reduces the time required for wiring work and voltage testing. The terminals of the integrated auxiliary contact are arranged on the second level.

¹ For DILMP20 to DILMP80 230 V 50 HZ 240 V 60 HZ, for DILMP125, DILMP160 and DILMP200 RAC240
² For DILMP20 24 VDC, for DILMP32 to DILMP200 RDC24

New 4-pole contactors from the xStart series

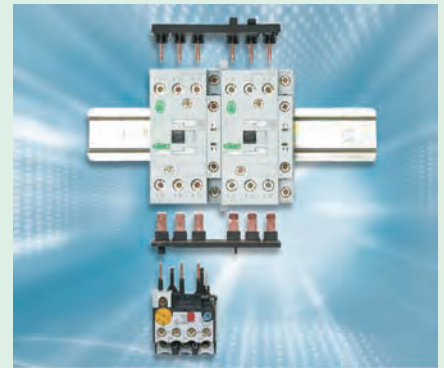
The new 4-pole contactor from Moeller optimized for AC-1 switched loads. They are the specialists for applications where the mains is switched off or over, heating systems are switched and 4-pole loads are switched.

Four compact contactors cover the performance range up to 200 A. The identical size for AC and DC operated contactors as well as a common range of accessories for 3 and 4-pole contactors guarantee efficient and simple planning and engineering.

Reversing Starter Combination and Star-Delta Combination

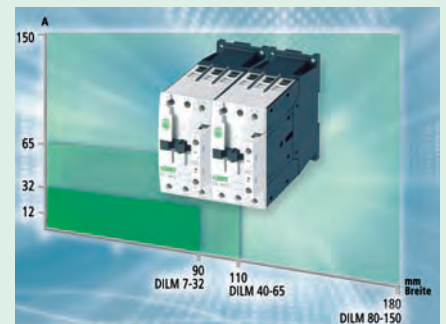


Wiring kits



The new reversing and star-delta wiring kits (DIL M32-XRL and DIL M32-XSL) for contactors from 12 A to 32 A come with a considerably more compact design. They now also fit between contactor and overload relay. The finished wiring kits considerably reduce the time required for mounting.

Reversing starter combinations come with a particularly slimline design



Moeller is also once more setting new standards with a more economical product system for the drive systems of its new contactor generation. New contactors DIL M have a considerably more compact design than their predecessors. The reversing starter combination is particularly slimline: The mounting width up to 32 A versions is 90 mm, 110 mm for versions between 32 A and 65 A, and just 180 mm for 65 A to 150 A versions.

Reversing combinations

AC-3 380 V/400 V		AC 230 V 50 HZ 240 V 60 HZ 24 V 50/60 HZ DC 24 V ¹	Reversing starter wiring set	Wiring set
I_e A	P kW	Part no. Add voltages from above	Coordination type "1"	Coordination type "2"
7	3	DIULM7/21 (...)	DILM12-XRL	PKZM0-XRM12
9	4	DIULM9/21 (...)		
12	5.5	DIULM12/21 (...)		
18	7.5	DIULM17/21 (...)	DILM32-XRL	PKZM0-XRM32
25	11	DIULM25/21 (...)		
32	15	DIULM32/21 (...)		
40	18.5	DIULM40/11 (...)	DILM65-XRL	—
50	22	DIULM50/11 (...)		
65	30	DIULM65/11 (...)		
80	37	DIULM80/11 (...)	DILM150-XRL	—
95	45	DIULM95/11 (...)		
115	55	DIULM115/11 (...)		
150	75	DIULM150/11 (...)		

Star-delta combinations

AC-3 380 V/400 V		AC 230 V 50 HZ 240 V 60 HZ DC 24 V ¹	Reversing starter wiring set	Wiring set
I_e A	P kW	Part no. Add voltages from above	Coordination type "1"	Coordination type "2"
12	5.5	SDAINLM12 (...)	DILM12-XSL	PKZM0-XSM12
16	7.5	SDAINLM16 (...)		
22	11	SDAINLM22 (...)		
30	15	SDAINLM30 (...)	DILM32-XSL	PKZM0-XSM32
45	22	SDAINLM45 (...)		
55	30	SDAINLM55 (...)		
70	37	SDAINLM70 (...)	DILM65-XSL	—
90	45	SDAINLM90 (...)		
115	55	SDAINLM115 (...)		
140	75	SDAINLM140 (...)	DILM95-XSL	—
165	90	SDAINLM165 (...)		
200	110	SDAINLM200 (...)	DILM150-XSL	—
260	132	SDAINLM260 (...)		

¹ for SDAINLM12 - SDAINLM55

Simple to select: DIL L – safe switching of lamp loads in the xStart system

Base units 3-pole

AC 24 V 50 Hz,
230 V 50 Hz 240 V 60 Hz,
400 V 50 Hz 440 V 60 Hz

Part no. Complement with above voltages		DILL12(...)	DILL18(...)	DILL20(...)
Rated operational current I_e AC1, conventional free air thermal current at 40° C 380 V, 400 V	A	27	40	45
Lighting load				
Filament lamp	A	14	21	27
Hybrid lamps	A	12	16	23
Fluorescent lamps				
Conventional choke-starter circuit	A	20	26	35
Duo circuit (series compensation)	A	20	26	35
Electronic upstream device	A	12	18	20
High-pressure mercury-arc lamps	A	12	18	20
Halogen metal vapour lamp	A	12	18	20
Sodium metal vapour arc lamps	A	12	18	20
Low-pressure sodium lamps	A	7.5	10	12
Maximum permissible compensation capacity	μF	470	470	470

The Xstart series has been extended by an additional device the contactor DILL for lighting loads. The DILL has been developed on the basis of the contactor DILM and has been optimised for switching lamps. The high switching capacity masters the inrush currents associated with all kinds of lamps. The box terminal enables the connection of larger conductor cross-sections in order to facilitate long distances.

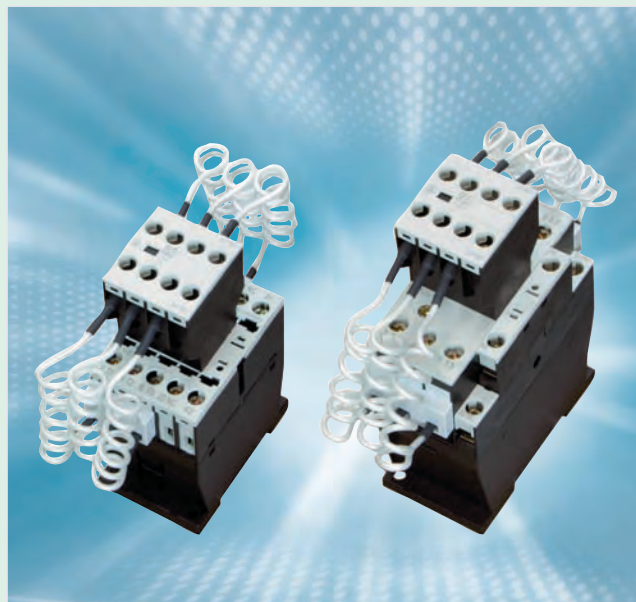


Simple to select: DIL K – contactor for reactive current compensation systems

Base units for group compensation

Three-phase capacitor 50 – 60 Hz open				
230 V	400 V 420 V 440 V	525 V	690 V	AC 230 V 50 Hz 240 V 60 Hz
kvar	kvar	kvar	kvar	
				Part no. Complement with above voltages
7.5	12.5	16.7	20	DILK12-11(...)
11	20	25	33.3	DILK20-11(...)
15	25	33.3	40	DILK25-11(...)
20	33.3	40	55	DILK33-10(...)
25	50	65	85	DILK50-10(...)

The contactors for capacitor have been developed on the basis of the DILM contactors and thus fit perfectly into the xStart system range. The installation and connection as well as the handling are identical with the Xstart standard contactors. In addition to a special anti-weld contact material, this contactor also contains series resistors. The capacitors are pre-charged via a special early-make auxiliary switch and only then do the main contacts then close and conduct continuous current.



High Rated Contactors DIL: Switching High Currents Reliably

xStart



Contactors DIL M from 580 A and contactors DIL H from 1400 A are vacuum contactors with significant advantages over air-break contactors:

- The electrical lifespan is considerably higher than air-break contactors.
- A higher packing density and cleaner distribution compartment are possible since there are no open arcs and therefore no escaping gases.

Highly efficient switching

The benefits of vacuum technology arise from the closed system of vacuum switching tubes that excludes any external influences on the switching operations inside the tubes and at the same time prevents switch gases from entering the environment. The most important feature of the vacuum tubes is the long lifespan when switching high currents.

This is due to the reduction of contact erosion since no switching arcs can be produced in a vacuum. The vacuum technology means the small device dimensions are possible compared to conventional contactors which switch in air. Even higher currents can be switched with switching tubes connected in parallel for switching resistive loads (AC-1).



**Use with large motors –
utilisation category AC-3/AC-4**

Whether for bow thrusters in ships, crusher for material recycling and hardboard production, mining machines, water treatment equipment or cement production, contactors DIL M can switch motors up to 1600 A reliably and safely. Circuit-breakers NZM and the motor protective relay ZEV ensure reliable motor protection. The extensive product range of circuit-breakers and accessories enable them to be adapted for a wide range of protection tasks with selectable tripping characteristics.



Use with utilisation category AC-1

Contactors DIL M and DIL H are used in several applications for isolating circuits when contactors are used for utilisation category AC-1 applications. For example, as mains connection devices for wind generators, for large heating outputs in plastics processing, induction welding in the steel and aluminium industry or for isolating in conjunction with power electronics.



All contactors DIL M and DIL H from 185 A to 2200 A are available with electronically-controlled drives. This provides outstanding benefits for your application:

- Flexible actuation
- Considerably lower switch cabinet temperatures due to reduced sealing power
- Design of smaller control transformers due to reduced pick-up power
- Considerably greater control voltage tolerance than required by the standard, ensuring greater reliability with voltage deviations
- Long lifespan of switching contacts, due to optimised contact forces
- Integrated suppressor
- Auxiliary contact equipped with 2 make contacts, 2 break contacts

Motor protective relay ZEV

The innovative motor protective relay ZEV is designed to protect motors up to 820 A against phase failure, overload and current imbalance. An earth fault is detected quickly by the external core-balance transformers. The integrated thermistor connection enables the relay to be upgraded to provide a full motor protective system. With eight preselectable tripping classes you can even control the most difficult starting conditions for motors with long starting times.

High Rated Contactors – Compact and Powerful

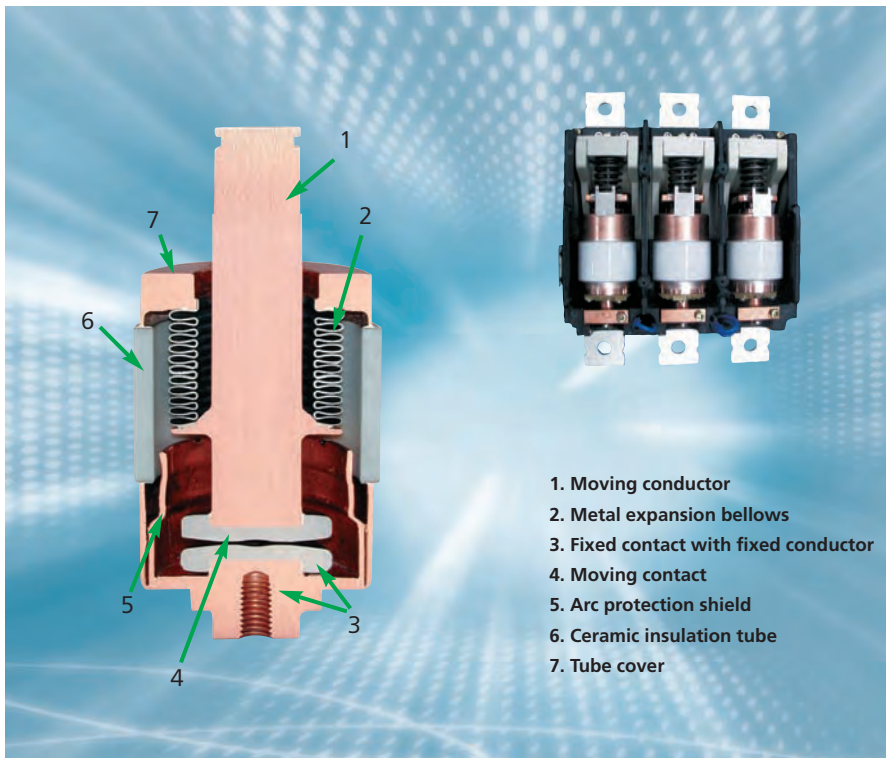
Compact dimensions

The vacuum switching tubes with the electromechanical drive system have a very compact design. Vacuum contactors therefore also offer outstandingly small dimensions.

A look inside the vacuum

The section drawing of the vacuum tubes shows the fixed and moving contact. The thin metal bellows expand and contract with the moving contact and ensure that the system is sealed during the frequent movements of the contact. All copper coloured parts in the drawing are energized.


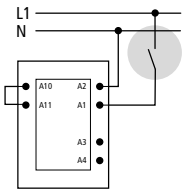

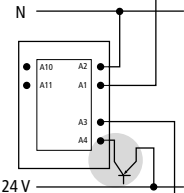

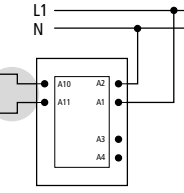
The ceramic insulation tube isolates the incoming and outgoing sides of the switching tube. The vacuum switching tube technology used has been tried and tested since the 1980s.

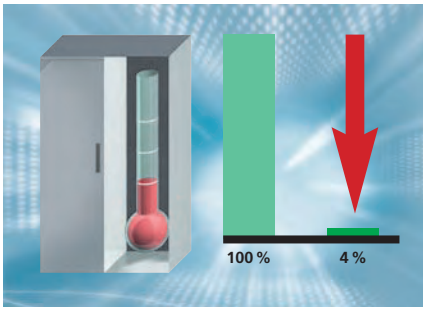


1. Moving conductor
2. Metal expansion bellows
3. Fixed contact with fixed conductor
4. Moving contact
5. Arc protection shield
6. Ceramic insulation tube
7. Tube cover

It's your choice: standard or premium version

All contactors from 185 to 570 A are available as standard or premium versions. All contactors over 570 A are premium version devices in all cases.

Contactor actuation		Standard	Premium
	Conventional: A1/A2 are energized in the usual manner.		+
	Directly from the PLC: A 24 V PLC output can be connected at terminals A3/A4 without the need of a coupling relay.		+
	From low power command devices: Low-power command devices such as board relays, control circuit devices or position switches can be connected directly to A10/A11.		+



Cool contactors reduce the costs for the switching cabinet

The contactors DIL M and DIL H reduce the sealing power required by up to 96 %, which in turn considerably reduces the temperature inside the switch cabinet. The costs for the switch cabinet and operating costs are also reduced. A smaller switch cabinet can be used than normally required, and expensive fans are often unnecessary.

Example: DIL M185 (RA250)

DC operated

Power consumption 3.3 Watt



Only four coils for every application

The premium version of the contactors DIL M enables you to cover all application ranges and voltages used worldwide with only four coils. This makes for simple engineering and mostly only requires one contactor in stock. The other voltage ranges of the coils ensure safe operation even with unreliable network conditions. Single voltage coils for the most typical voltages used worldwide are available for the standard contactors.

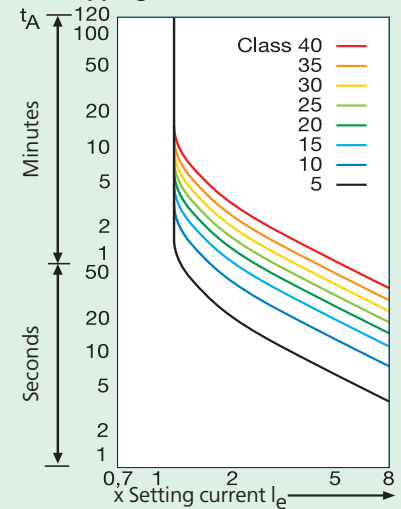


User benefits of the innovative motor protective relay ZEV

User-friendliness has top priority with the motor protective relay ZEV.

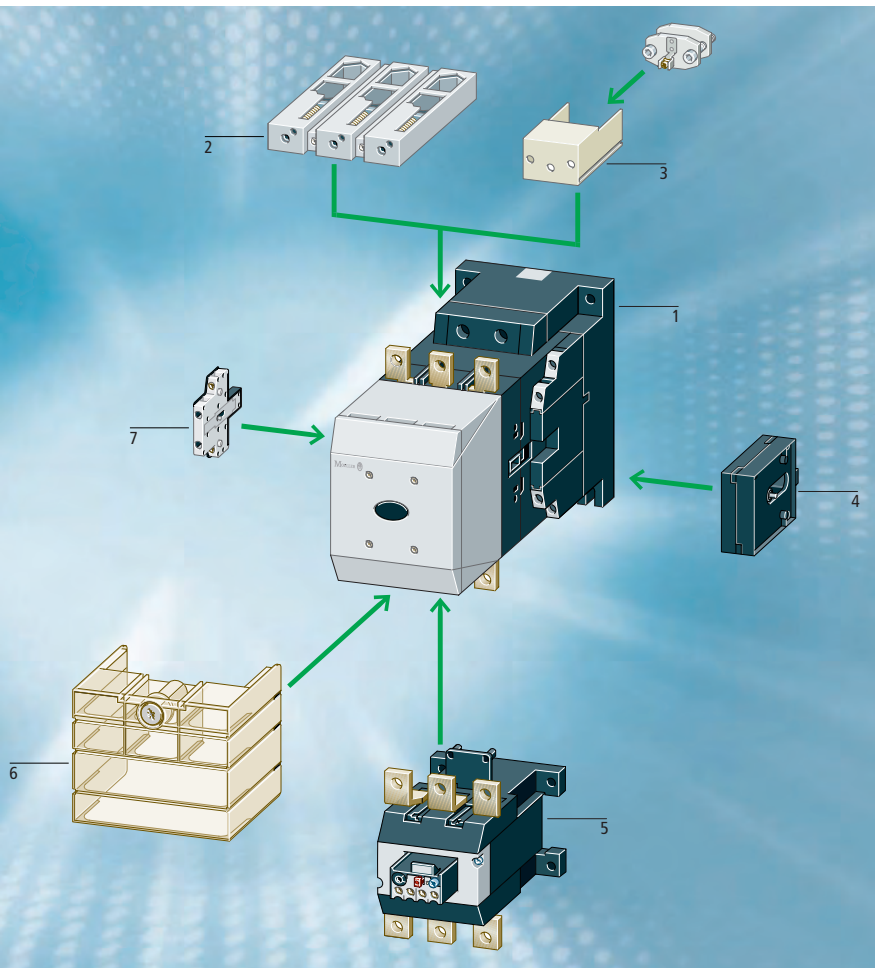
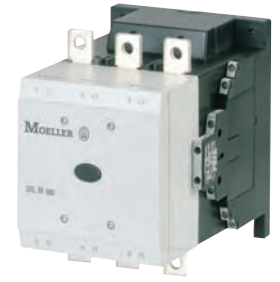
- Simple engineering with multi-voltage coils (24-240 V, 50/60 Hz or DC)
- All settings are menu guided, enabling currents, tripping classes and other functions to be set easily.
- Small and light current sensors with exceptionally broad current ranges simplify selection. The cables are simply passed through the sensors.
- With large currents, the sensor belts are wrapped round the cable and secured with a Velcro fastener (see picture).
- All three phase symbols – L1, L2, L3 – are displayed, so that a faulty phase can be indicated quickly: The symbol for the faulty phase flashes distinctively.
- Differentiated signalling: A trip caused by the thermistor or in the event of an overload can be indicated separately.
- Prewarning on overload: A prewarning is visually indicated or output via a contact before the device trips.

ZEV tripping characteristics



The motor protective relay ZEV can control even the most difficult startup conditions. The extended tripping classes up to Class 40 ensure the reliable protection of motors with long starting times. Optimum protection for any motor startup condition can be provided by selecting one of the eight tripping classes between 5 and 40.

Simply Select: Contactors DIL M and DIL H up to 2200 A



Contactor, 3-pole

AC-1	AC-3	Standard electronics	
		AC: 110 - 120 V 50/60 Hz 220 - 240 V 50/60 Hz	
$I_e=I_{th}$ at 60° C	I_e A (400 V)	P kW (400 V)	Part no.
			Add voltages from above
275	185	90	DILM185-S/22(...)
315	225	110	DILM225-S/22(...)
350	250	132	DILM250-S/22(...)
400	300	160	DILM300-S/22(...)
500	400	200	DILM400-S/22(...)
700	500	250	DILM500-S/22(...)
750	570	315	DILM570-S/22(...)
800	580	315	—
850	650	355	—
900	750	400	—
1000	820	450	—
1000	1000	560	—
1400	—	—	—
1800	1600	900	—
2000	—	—	—
2200	—	—	—

UL/CSA see page 124

1. Contactors 90 - 900 kW
2. Cable terminal block
3. Flat strip conductor terminals
4. Mechanical interlock
5. Overload relay
6. Terminal cover, finger-proof
7. Auxiliary contact modules, 2-pole, side mounted



Redundant design of contactors becomes unnecessary



		Auxiliary contacts		Overload/motor protection			
Premium electronics		2 DILM1000-XHI11SI integrated		Relays		Circuit-breakers	
AC/DC: RDC48*, RA110* RA250*, RAC500* conventionel		AC/DC: RDC110* RA250*, RAC500* vacuum		Optional Max. total number of auxiliary contacts: 8			
Part no.	Part no.	Contacts	Part no.	Part no.	Part no.	Part no.	Part no.
Add voltages from above	Add voltages from above		SI at side internally SA at side externally				
DILM185/22(...)	–	2N/O 2N/C	DILM1000-XHI11-SI	Z5	ZW7	ZEV	NZM...
DILM225/22(...)	–	2N/O 2N/C	DILM1000-XHI11-SA				
DILM250/22(...)	–	2N/O 2N/C	DILM1000-XHI11V-SI				
DILM300/22(...)	–	2N/O 2N/C	DILM1000-XHIC11-SI				
DILM400/22(...)	–	2N/O 2N/C	DILM1000-XHIC11-SA				
DILM500/22(...)	–	2N/O 2N/C					
–	–	2N/O 2N/C					
–	DILM580/22(...)	2N/O 2N/C					
–	DILM650/22(...)	2N/O 2N/C					
–	DILM750/22(...)	2N/O 2N/C					
–	DILM820/22(...)	2N/O 2N/C					
–	DILM1000/22(...)	2N/O 2N/C					
–	DILH1400/22(RAW250)*	2N/O 2N/C				IZM...	
–	DILM1600/22(RAW250)*	2N/O 2N/C					
–	DILH2000/22(RAW250)*	2N/O 2N/C					
–	DILH2200/22(RAW250)*	2N/O 2N/C					

* RDC48 = 24-48 V DC, RA110 = 48-110 V, 40-60Hz/48-110 V DC, RA250 = 110-250 V, 40-60Hz/110-250 V DC, RAC500 = 250-500 V, 40-60Hz, RAW250 = 230-250 V, 40-60Hz/DC

CMD contactor monitoring device

The CMD (Contactor Monitoring Device) monitors the main contacts of a contactor for welding. For this it compares the contactor control voltage with the state of the main contacts, which is indicated reliably by a mirror contact (IEC EN 60947-4-1 Ann. F). If the contactor coil is de-energized and the contactor does not drop out, the CMD trips the backup circuit-breaker, motor-protective circuit-breaker or switch-disconnector via an undervoltage release. The CMD also monitors the functioning of the internal relay using an additional auxiliary make contact of the monitored contactor. For this the auxiliary make and break contact is positively driven. The break contact is designed as a mirror contact.

Components with which the CMD can be combined	
Contactors	Motor-protective circuit-breakers and circuit-breakers
DIL EM	PKZ 2 + U-PKZ2 (18 VDC)
DIL M 7 to DILM 150	NZM 1 + NZM1-XUVL
DIL M 185 (-S) bis DILM 500 (-S)	NZM 2 + NZM2/3-XUVL
DIL M 580 to DIL M 1600	NZM 3 + NZM2/3-XUVL
DIL H 1400 to DIL H 2000	NZM 4 + NZM4-XUVL
SE-A-PKZ2 and S-PKZ2	N1 + NZM 1-XUVL
	N2 + NZM 2/3-XUVL
	N3 + NZM 3/3-XUVL
	N4 + NZM 4-XUVL

Non-Combination Motor-Starter DILM/Z for North America

Motor starter combinations (Non-Combination Motor Starters) DILM / Z for use in North America									
Maximum HP Ratings, 3-phase, 60 Hz, at:				Motor Full Load Current FLC A	Contactor Part no.	Overload Relay Part no.	Maximum Protective device for North America		
208 V (200 V) HP	240 V (230 V) HP	480 V (460 V) HP	600 V (575 V) HP				Fuse As per CEC / NEC ¹⁾ A	Circuit Breaker Rated Current A	Instantaneous Short-circuit Trip A
-	-	1/2	1/2	1	DILEEM	ZE-1	3	15	-
-	-	3/4	1	1.4	DILEEM	ZE-1,6	6	15	-
1/2	1/2	1	1 1/2	2.3	DILEEM	ZE-2,4	6	15	-
1	1	2	3	3.9	DILEEM	ZE-4	15	15	-
1 1/2	1 1/2	3	-	6	DILEEM	ZE-6	20	15	-
1 1/2	2	-	-	6.8	DILEEM	ZE-9	35	15	-
1 1/2	2	5	5	7.8	DILEM	ZE-9	35	15	-
1 1/2	3	5	5	9.6	DILEM	ZE-12	45	-	-
-	-	1/2	1/2	1	DILM7	ZB12-1	3	25	200
-	-	1/2	1	1.4	DILM7	ZB12-1,6	6	25	200
1/2	1/2	1	1 1/2	2.3	DILM7	ZB12-2,4	6	25	200
1	1	2	3	3.9	DILM7	ZB12-4	15	25	200
1 1/2	1 1/2	3	-	6	DILM7	ZB12-6	20	25	200
3	-	-	7 1/2	9	DILM9	ZB12-10	25	25	200
3	3	5	7 1/2	9.6	DILM12	ZB12-10	25	25	200
3	-	7 1/2	10	11	DILM12	ZB12-12	40	25	200
5	5	10	-	15.2	DILM15	ZB12-16	40	30	320
-	-	1/2	1/2	1	DILM17	ZB32-1	3	25	200
-	-	3/4	1	1.4	DILM17	ZB32-1,6	6	25	200
1/2	1/2	1	1 1/2	2.3	DILM17	ZB32-2,4	6	25	200
1	1	2	3	3.9	DILM17	ZB32-4	15	25	200
1 1/2	1 1/2	3	-	6	DILM17	ZB32-6	20	25	200
-	3	5	7 1/2	9.6	DILM17	ZB32-10	25	25	200
-	-	7 1/2	10	11	DILM17	ZB32-12	40	30	320
5	5	10	-	15.2	DILM17	ZB32-16	40	30	320
7 1/2	7 1/2	15	20	22	DILM25	ZB32-24	90	100	1200
10	10	20	25	32.2	DILM32	ZB32-32	125	125	1200
-	3	5	7,5	9.6	DILM40	ZB65-10	40	40	380
-	5	10	10	15.2	DILM40	ZB65-16	60	60	760
-	7 1/2	20	25	32.2	DILM40	ZB65-24	90	90	1200
10	10	20	30	34	DILM40	ZB65-40	125	125	1200
15	20	40	50	54	DILM50	ZB65-57	200	150	2000
20	20	50	50	63	DILM65/72	ZB65-65	200	150	2000
25	30	60	75	80	DILM80	ZB150-70	250	250	-
25	40	75	100	104	DILM95	ZB150-100	J 400	J 400	-
40	50	100	100	130	DILM115	ZB150-125	J 400	J 500	-
40	60	125	125	156	DILM150/170	ZB150-150	J 600	J 600	-
-	60	125	150	156	DILM185	Z5-160	700 CLASS L	600	7200
-	75	150	200	192	DILM225	Z5-220	700 CLASS L	600	7200
-	100	200	250	248	DILM250	Z5-250	700 CLASS L	600	7200
-	125	250	300	312	DILM300	ZW7-400	800 CLASS L	600	7200
-	150	300	400	382	DILM400	ZW7-400	800 CLASS L	600	7200
-	200	400	500	480	DILM500	ZW7-540	800 CLASS L	600	7200
-	200	400	600	480	DILM580	ZEV-XSW820	2000	-	-
-	250	500	600	600	DILM650	ZEV-XSW820	2000	-	-
-	300	600	700	700	DILM750	ZEV-XSW820	2000	-	-
-	350	700	860	860	DILM820	ZEV-XSW820	2000	-	-

¹⁾ North American type fuses only.

Motor contactors for the North American market

Motor contactors in North America are industrial control devices (Industrial Control Equipment per UL 508 and CSA-C22-2 No. 14). North American buyers specify either contactors with so-called „NEMA-Sizes“, or they purchase components specifically for motor switching, which are rated in (HP) Horsepower and can be more customized for the application. The **table** shows the relationship of power and nominal current ratings corresponding to each respective NEMA-size.

Moeller contactors Type DIL M7 through DIL M65, and matching Type Z overload relays, each have a basic short circuit rating of 5 kA. Larger Moeller contactors starting with the DIL M80 have, together with their corresponding Type Z overload relays, a short circuit rating of 10 kA.

Combination “Contactor + Overload Relay” („Non-combination Motor Starter“)

NEMA-sizes, as they relate to the HP ratings of Moeller contactors, are provided in the table on the left side. Contactors and overload relays make up an assembly that is referred to in North America as a „Non-combination motor starter“. For these assemblies, namely consisting of “Contactor + Overload Relay“, the North American buyer specifies the same ordering information as it applies to individual contactors. The table clearly indicates that, with respect to all common nominal voltage levels, the combination of „IEC style“ contactors DIL M with overload relays Type Z create many more starter combinations than corresponding straight NEMA sizing would allow for.

Three Phase NEMA Contactors NEMA-Sizes	Rated Current	Three Phase HP ratings ¹⁾			
		200 V / 60 Hz	230 V / 60 Hz	460 V / 60 Hz 575 V / 60 Hz	Highest short time duration current
		A	HP (PS)	HP (PS)	HP (PS)
00	9	1 ½	1 ½	2	11
0	18	3	3	5	21
1	27	7 ½	7 ½	10	32
2	45	10	15	25	52
3	90	25	30	50	104
4	135	40	50	100	156
5	270	75	100	200	311
6	540	150	200	400	621
7	810	-	300	600	932
8	1215	-	450	900	1400
9	2250	-	800	1600	2590
	¹⁾ HP ratings for 3-Phase contactors, single speed motors, with no jogging, reversing and dynamic current braking.				

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