Contactor combinations 30-135 kVA
Switch combinations 14-866 kVA

Eaton.com

Efficient grid protection
Network and system protection to VDE-AR-N 4105 and VDE-AR-N 4110

EATON

Powering Business Worldwide

Network and system protection with low internal consumption

The VDE AR-N 4105 code of practice for the operation of photovoltaic systems in low-voltage grids entered into force in January 2012. On July 1, 2012, it also became mandatory for other distributed power generation systems such as cogeneration and biogas plants or wind turbines. The aim of the standard is to ensure grid stability and to provide greater security of supply in the face of the growing number of power generation plants: If the grid voltage or frequency reaches impermissible levels, operators must shut down their power generation system.

As a leading manufacturer of low-voltage switchgear, Eaton offers you complete, straight-out-of-the-box solutions as well as individual components such as contactors with low holding power and motor-driven circuit breakers with low-power undervoltage releases. Our contactors are approved for use as tie breakers in systems up to 135 kVA. For larger systems, motor-operated circuit breakers or switch-disconnectors can be used. Depending on your application, Eaton will supply you with the right 3-pole or 4-pole solution covering the power range from 14 to 866 kVA (20 to 1,250 A).

In the case of systems >30 kVA, central network and system (NAS) protection is required. This type of protection should be installed at the meter to monitor the voltage and frequency and will disconnect the tie breaker in the event of a fault.

Ready-to-connect NAS protection up to 135 kVA

Power system protection with extremely low internal consumption

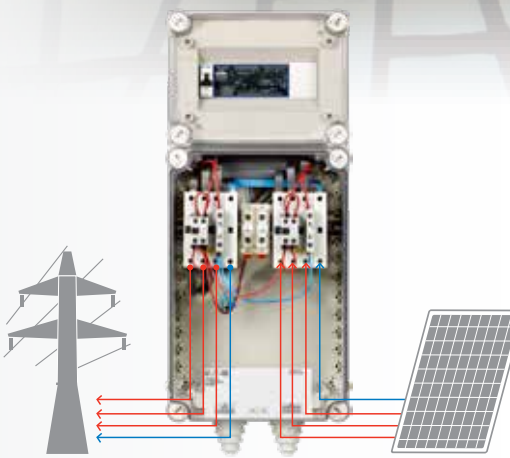
Eaton has developed a new generation of power system protection for installations between 30 and 135 kVA that meets the revised requirements of VDE-AR-N 4105. Consisting of a contactor that is continuously monitored by power system relays, it provides single fault protection in the event of a fault by transmitting a shutdown signal to the power generation system.

First generation NAS contactor combinations are available in four power classes and two sizes:

Second generation NAS contactor combinations are available in five power classes and two sizes.

What's new in VDE-AR-N 4105 and 4110:2018-11

- **The boundary between low and medium voltage is now set at PAmax = 135 kW, and the 100 kW limit for contactors is no longer applicable.** In response, Eaton offers a new power class up to 130 kW
- **It is no longer necessary to use two contactors in order to implement "single-fault protection," which still needs to be ensured.** To save costs, Eaton offers a solution with only one tie breaker. Single-fault protection is achieved by means of a second switch-off signal to the power generation system.
- **In the event of a fault, power generation systems must support the grid, meaning the NAS protection must not switch off before 3.0 s if the voltage drops to 0.8 Un, and not before 300 ms if it drops to 0.45 Un.** The electronic control of the DILMP... (RAC240) contactor enables compliance with the specifications without the need for additional components such as power supplies or buffers. This minimizes costs and saves working time. In applications with circuit breakers and switch-disconnectors, a U-type release is used to switch off the system, which requires the use of an appropriate buffer.



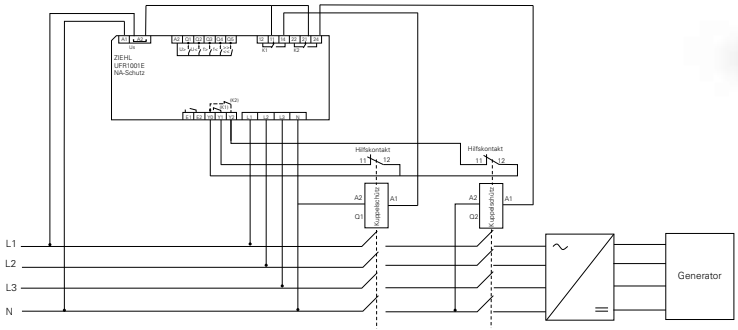
At a glance

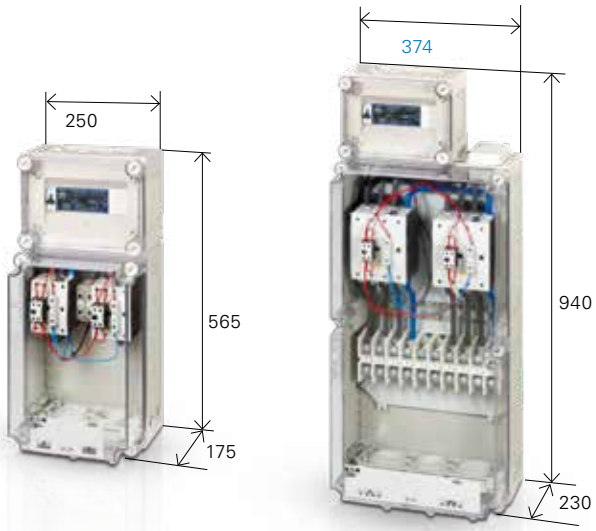
Central network and system protection according to VDE-AR-N 4105 with contactors for the performance range from 30 to 135 kVA

- Undervoltage/overvoltage monitoring
- Underfrequency/overfrequency monitoring
- Power quality monitoring (10-minute mean value)
- Vector shift monitoring can be added
- Single-fault proof
- Self test
- Default settings according to VDE-AR-N 4105, values can be changed
- Degree of protection: IP65
- Alarm counter, alarm total time
- Sealing option and code protection
- 4-pole contactors (3+N phases)
- PE terminals
- Total switch-off time < 150 ms
- Switch position indicator
- Low internal consumption
- Type-tested
- For all network configurations

Technical data for first generation contactor combinations

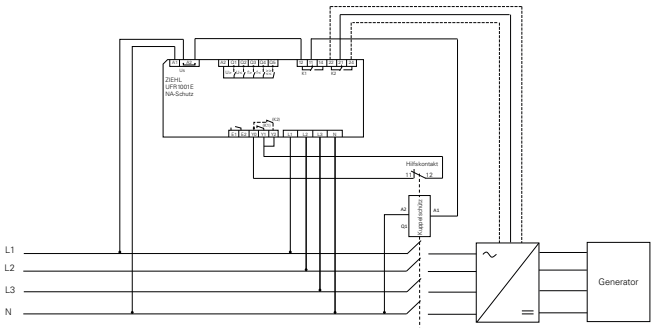
Complies with the code of practice and continues to be permissible

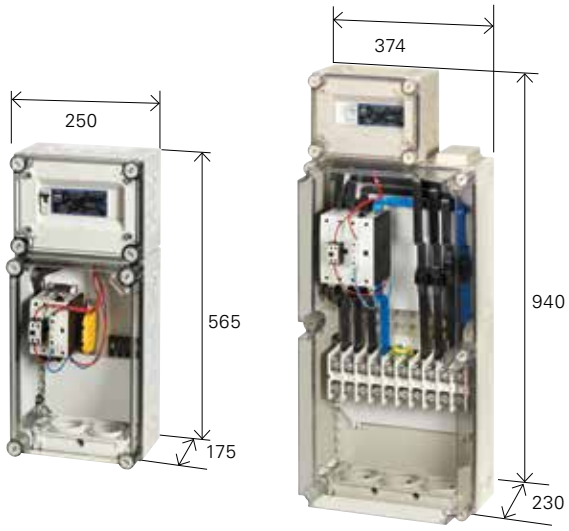




NAS protection combination (IP 65 degree of protection)					
Type designation		NAS63-CI-1	NAS80-CI-1	NAS125-CI-1-K95	NAS160-CI-1-K95
Article no.		168106	168107	168110	168111
Rated power	kVA	43	55	86	100
Rated operational voltage	V	230/400			
Rated current AC-1	A	63	80	125	160
Pick-up power consumption					
Monitoring relay	VA	5		5	
2 contactors	VA	90		360	
Holding power consumption					
Monitoring relay	W	5		5	
2 contactors	VA/W	3/3		6.2/4.2	
Internal power consumption	kWh/a	70		98	
Total switch-off time (including NAS protection relay)	ms	< 150			
Permissible ambient temperature range	°C	-20 ... +40			
Duty cycle	% duty cycle	100			
Max. terminal capacity		**Contactors**		**Terminals**	
Flexible with ferrule	mm²	35 (Cu)		95 (Cu)	
Stranded	mm²	50 (Cu)		95 (Cu)	
Sector conductor, solid	mm²	-		70 (Al)	
Sector conductor, stranded	mm²	-		95 (Cu)	
PE terminals					
Flexible with ferrule	mm²	50 (Cu)		95 (Cu)	
Stranded	mm²	50 (Cu)		95 (Cu)	
Sector conductor, solid	mm²	-		70 (Al)	
Sector conductor, stranded	mm²	-		95 (Cu)	
NAS protection relay		With integrated UFR1001E (manufactured by ZIEHL)			
Tie breaker					
Type		4-pole contactors			
Type designation		DILMP63 (RAC240)	DILMP80 (RAC240)	DILMP125 (RAC240)	DILMP160 (RAC240)
Article no.		167512	167513	109905	109915
Making capacity	A	560	700	1120	1330
Breaking capacity	A	400	500	800	950
Short-circuit protection	A (gG)	125	160	250	250
Prospective short-circuit current	kA	100	100	100	100
Opening delay	ms	45		40	

Technical data for second generation contactor combinations





Type designation		NAS63-CI-2	NAS80-CI-2	NAS125-CI-2-K95	NAS160-CI-1-K95	NAS190_CI-2-K150
Article no.		198273	198274	198275	198276	198277
Rated power	kVA	43	55	86	100	130
Rated operational voltage	V	230/400				
Rated current AC-1	A	63	80	125	160	190
Pick-up power consumption						
Monitoring relay	VA	5		5		
Contactor	VA	45		180		
Holding power consumption						
Monitoring relay	W	5		5		
Contactor	VA/W	1.5/1.5		3.1/2.3		
Internal power consumption	kWh/a	57		64		
Total switch-off time (including NAS protection relay)	ms	< 150				
Permissible ambient temperature range	°C	-20 ... +40				
Duty cycle	% duty cycle	100				
Max. terminal capacity		**Contactors**		**Terminals**		
Flexible with ferrule	mm²	35 (Cu)		95 (Cu)		150 (Cu)
Stranded	mm²	50 (Cu)		95 (Cu)		150 (Cu)
Sector conductor, solid	mm²	-		70 (Al)		120 (Al)
Sector conductor, stranded	mm²	-		95 (Cu)		150 (Cu)
Tie breaker						
Type		4-pole contactors				
Type designation		DILMP63 (RAC240)	DILMP80 (RAC240)	DILMP125 (RAC240)	DILMP160 (RAC240)	DILMP200(RAC240)
Article no.		167512	167513	109905	109915	109925
Making capacity	A	560	700	1120	1330	1800
Breaking capacity	A	400	500	800	950	1150
Short-circuit protection	A (gG)	125	160	250	250	250
Prospective short-circuit current	kA	100	100	100	100	100
Opening delay	ms	45		40		41

Expertise in distributed power generation plants

The new code of practice also specifies a number of new product requirements:

- For systems <135 kW, the specifications of VDE-AR-N 4105:2018-11 apply
- For systems => 135 kW, the specifications of VDE-AR-N 4110:2018-11 apply
- The 100 kW limit for contactors has been dropped

Distributed power generation plants, such as photovoltaic installations, wind turbines, hydroelectric power plants and cogeneration plants, generate electricity in a decentralized manner that is then fed into the power grid.

This process needs to be controlled in order to guarantee that the frequency and voltage of the public grid remains stable.

Network and system protection

- NAS protection must be dual channel and single-fault proof
- 2-level password protection and sealing
- Additional threshold for voltage drop protection <<U
- Parameters can be adjusted

NAS protection monitors the following:

- Mains frequency
- Mains voltage
- Mean value for over-/undervoltage
- Test function

Tie breaker

- It is also possible to use only one tie breaker, provided that single-fault protection is ensured by means of a shutdown signal to the power generation system.
- The tie breaker must be installed in the distribution section of the central metering point or in a circuit distributor directly at the metering point.
- The tie breaker must be able to bridge a voltage dip to <0.85*UN for 3 seconds and a voltage dip to 0.45*UN for 300 ms.
- Parameters can be adjusted

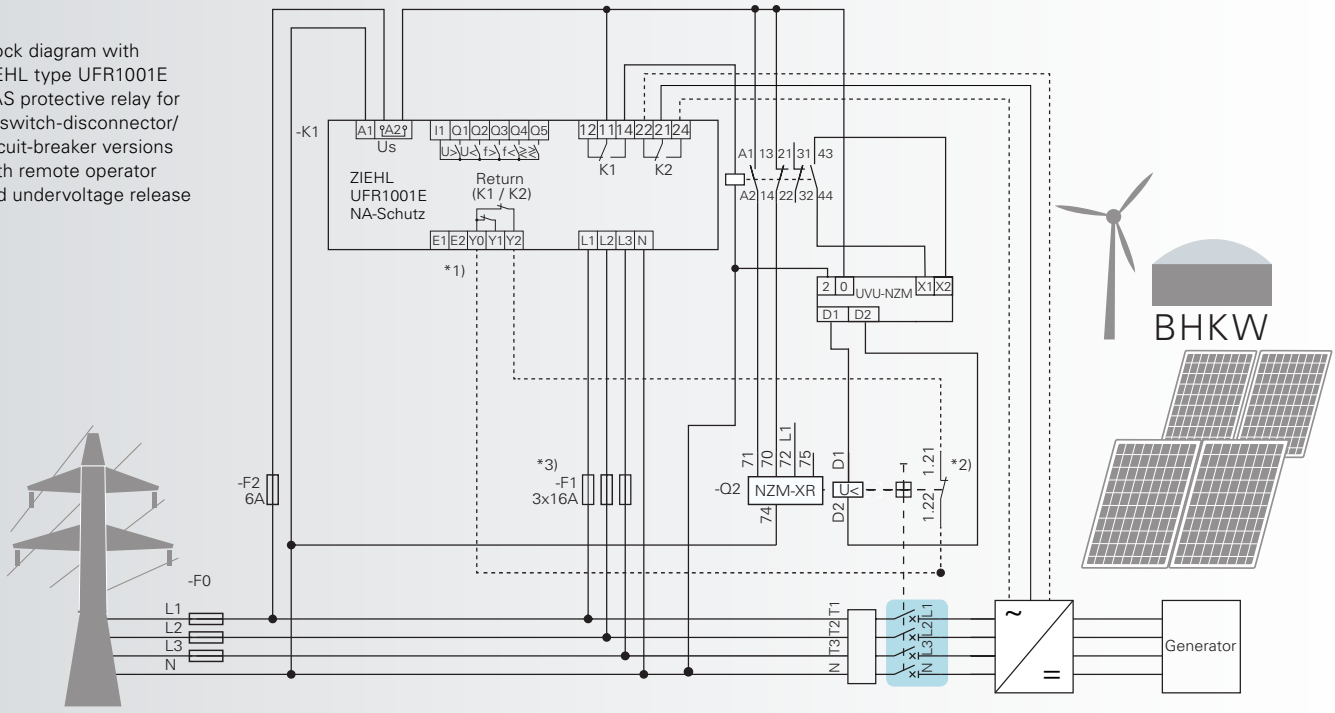
NAS circuit breakers from 14 to 866 kVA

With energy saving technology

Proven circuit breakers for large systems: 3- and 4-pole tie breakers with remote operator (20 to 1,250 A)

Users can assemble a tie breaker from a circuit breaker or a switch-disconnector with remote operator, alongside an undervoltage release, a contactor relay and an NAS protection relay. With a short-circuit breaking capacity of 50 kA, these combinations are suitable for supplying mains with up to 2 x 1,000 kVA of transformer power. If switch-disconnectors are used, a fuse is required for upstream short-circuit protection. Thanks to their low-loss remote operators and undervoltage releases with less than 3.6 VA holding power, both switch types are ideal for use in high-efficiency systems. And thanks to their compact, space-saving design, they can be mounted side by side or on top of one another, depending on the application. For easy connection, we offer a wide range of accessories with box and control-circuit terminals.

Block diagram with ZIEHL type UFR1001E NAS protective relay for all switch-disconnector/ circuit-breaker versions with remote operator and undervoltage release



Single-fault proof, also monitors the connected tie breakers (this function can be switched off)
*1) Feedback contacts are not connected: trEL -> set ZIEHL relay UFR1001E to OFF
*2) Normally open contacts can be used alternatively, automatic detection via ZIEHL relay UFR1001E
*3) In the case of short-circuit proof wiring (max. 3 m), circuit breakers can be omitted.

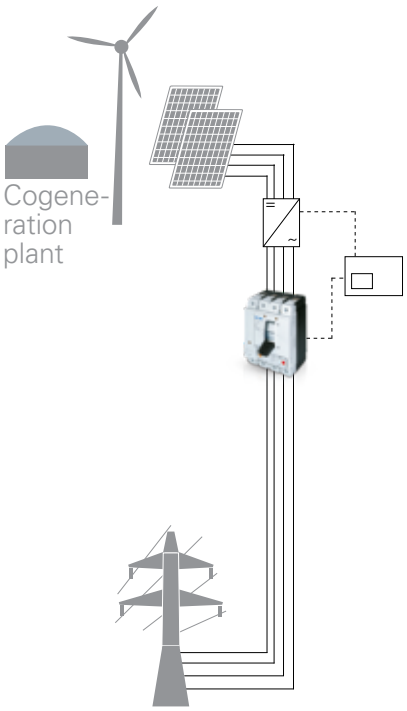
Technical data for NAS circuit breakers

The use of tie breakers in accordance with VDE-AR-N-4105 and 4110:2018-11 is recommended

Low-voltage network ~ 400 V / 230 V
3-pole switching in TN-C and 4-pole switching in TN-S systems two options are available:

- Circuit breaker
- Switch-disconnector

The switch-disconnector option requires an upstream short-circuit protection (fuse).



			4-pole			3-pole		
Apparent power	**Rated current**		**Circuit breaker or**	**switch-disconnector**	**Fuse**	**Circuit breaker or**	**switch-disconnector**	**Fuse**
kVA	A		(Icu= 50 kA)		A gL max.	(Icu= 50 kA)		A gL max.
	L1L2L3	N (%)	4-pole	4-pole		3-pole	3-pole	
			Part no. (article no.)	Part no. (article no.)		Part no. (article no.)	Part no. (article no.)	
14	20	100	NZMH2-4-A20 281287	N2-4-160 266014	250	NZMH2-A20 281281	N2-160 266008	250
17	25	100	NZMH2-4-A25 281289	N2-4-160 266014	250	NZMH2-A25 281282	N2-160 266008	250
22	32	100	NZMH2-4-A32 281291	N2-4-160 266014	250	NZMH2-A32 281283	N2-160 266008	250
28	40	100	NZMH2-4-A40 265823	N2-4-160 266014	250	NZMH2-A40 259095	N2-160 266008	250
35	50	100	NZMH2-4-A50 265825	N2-4-160 266014	250	NZMH2-A50 259096	N2-160 266008	250
44	63	100	NZMH2-4-A63 265827	N2-4-160 266014	250	NZMH2-A63 259097	N2-160 266008	250
55	80	100	NZMH2-4-A80 265829	N2-4-160 266014	250	NZMH2-A80 259098	N2-160 266008	250
69	100	100	NZMH2-4-A100 265831	N2-4-160 266014	250	NZMH2-A100 259099	N2-160 266008	250
87	125	100	NZMN2-4-A125 265858	N2-4-160 266014	250	NZMN2-A125 259091	N2-160 266008	250
111	160	100	NZMN2-4-A160 265860	N2-4-160 266014	250	NZMN2-A160 259092	N2-160 266008	250
		60	NZMN2-4-A160/100 265861					
139	200	100	NZMN2-4-A200 265863	N2-4-200 266015	250	NZMN2-A200 259093	N2-200 266009	250
		60	NZMN2-4-A200/125 265864					
222	320	100	NZMN3-4-A320 109694	N3-4-400 266023	630	NZMN3-A320 109669	N3-400 266019	630
		60	NZMN3-4-A320/200 109695					
277	400	100	NZMN3-4-A400 109696	N3-4-400 266023	630	NZMN3-A400 109670	N3-400 266019	630
		60	NZMN3-4-A400/250 109697					
346	500	100	NZMN3-4-AE630 265894	N3-4-630 266024	630	NZMN3-AE630 259115	N3-630 266020	630
		60	NZMN3-4-AE630/400 265895					
554	800	100	NZMN4-4-AE800 265909	N4-4-800 266029	1600	NZMN4-AE800 265759	N4-800 266025	1600
		60	NZMN4-4-AE800/500 265910					
693	1000	100	NZMN4-4-AE1000 265912	N4-4-1000 266030	1600	NZMN4-AE1000 265760	N4-1000 266026	1600
		60	NZMN4-4-AE1000/630 265913					
866	1250	100	NZMN4-4-AE1250 265915	N4-4-1250 266031	1600	NZMN4-AE1250 265761	N4-1250 266027	1600
		60	NZMN4-4-AE1250/800 265916					

Notes

- Max. ambient temperature 50 °C; otherwise, please refer to the derating table
- Alternative 135 kVA contactors are permissible
- Necessary accessories for automated closing and fast opening:
  1 remote operator, 1 undervoltage release and 1 auxiliary contact each

Accessories

	Undervoltage release	Remote operator	Contactor relay	Cover	Auxiliary contacts			Box terminal	Box terminal	Control-circuit terminal	
				4- pole	[on/off]		tripped HIA	(top or bottom)	(top or bottom)	for screw connection	for box terminal
				4-pole	N/O contact	N/C contact	N/O contact	4-pole	3-pole		
	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)	Part no. (article no.)
	UVU-NZM 260154 + NZM2/3-XUV 259527	NZM2-XRD208-240AC 115391	DILA-22 (230V50HZ, 240V60HZ) 276399	NZM2-XAVPR 266677	M22-K10 216376	M22-K10 216376 M22-K01 216378	M22-K01 216378 M22-K10 216376	NZM2-4-160-XKC 266755	NZM2-160-XKC 262240	NZM2-XSTS 260156	NZM-XSTK 266739
								NZM2-4-250-XKC 266756	NZM2-250-XKC 262244		
								NZM2-4-250-XKC 266756			
		NZM3-XR208-240AC 259850		NZM3-XAVPR 266678				NZM3-4-XKC 266783	NZM3-XKC 260042	NZM3/4-XSTS 266797	
	UVU-NZM 2606154 + NZM4-XUV 266588	NZM4-XR208-240AC 266685		integrated -				NZM4-4-XKA 266837	NZM4-XKA 266836		integrated -
				integrated -							integrated -
				integrated -							integrated -
				integrated -							integrated -
				integrated -							integrated -
				integrated							integrated -

- Optional accessories depending on the type of connection: box terminals for direct connection of Cu cables (in the case of BG4, aluminum cables are also possible), control-circuit connection with 3 terminal points (up to 1 x 2.5 mm2 or 2 x 1.5 mm2) at top or bottom
- Switch-off time via undervoltage release: NZM2/N2: 19 ms, NZM3/N3: 19 ms, NZM4/N4: 23 ms
- Closing delay via remote operator: NZM2/N2: 170 ms, NZM3/N3: 80 ms, NZM4/N4: 100 ms
- Minimum distance between switches if mounted on top of one another: NZM2/N2: 25 mm, NZM3/N3: 60 mm, NZM4/N4: 100 mm

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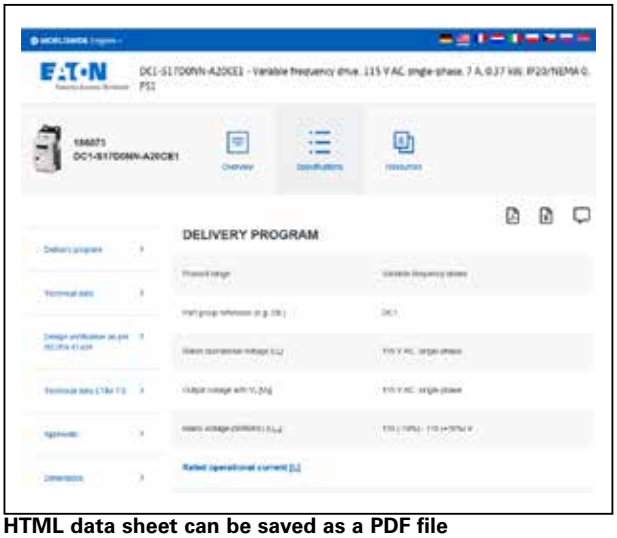

HTML data sheet can be saved as a PDF file

Parts list, e.g. for queries to Eaton sales

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Publication no.: BR01301001Z-EN
April 2023

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