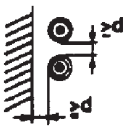
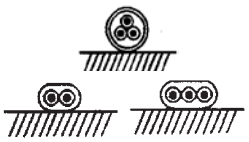
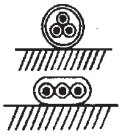
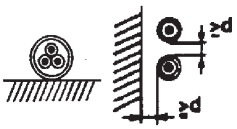
Table 12-1: current rating

For cables with a nominal voltage of up to 1000 V and for heat-resistant cables at an ambient temperature of +30 °C.
You can find general regulations and recommended values in DIN VDE 0298 part 2 and part 4.

The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 11 and 15, and based on DIN VDE 0891, 1990-05, part 1.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Cable category						
	A **Single-core cables** • Rubber insulation • PVC insulation • TPE insulation • Heat-resistant	**B** **Multi-core cables for domestic/handheld equipment** • Rubber insulation • PVC insulation • TPE insulation		**C** **Multi-core cables excl. domestic/handheld equipment** • Rubber insulation • PVC insulation • TPE insulation • Heat-resistant	**D** **Multi-core rubber-sheathed cables** min. 0.6/1 kV **Single-core** **Special rubber core cables** 0.6/1 or 1.8/3 kV	
Installation type						
Number of cores under load	**1**[3]	**2**	**3**	**2 or 3**	**3**	**1**[3]
Nominal cross-section in mm²	**Current rating in A**	**Current rating in A**		**Current rating in A**	**Current rating in A**	
0.08[1]	3	-	-	2	-	-
0.14[1]	4.5	-	-	3	-	-
0.25[1]	7	-	-	4.5	-	-
0.34[1]	8	-	-	5	-	-
0.5	12[2]	3	3	9[2]	-	-
0.75	15	6	6	12	-	-
1.0	19	10	10	15	-	-
1.5	24	16	16	18	23	30
2.5	32	25	20	26	30	41
4	42	32	25	34	41	55

[1] Current rating values for small conductor cross-sections taken from VDE 0891-1 (0.08 mm² – 0.34 mm²)
[2] Extended range for 0.5 mm² in line with VDE 0298-4, 2003-08, table 11
[3] When bundling single-core, touching or bundled cables, when installed on surfaces, in the open air or on cable conduits, please observe DIN VDE 0298-4, 2013-06, table 10

IMPORTANT:
The information portrayed in this table differs from that in DIN VDE 0298-4, 2013-06.
As such, in the event of any uncertainty the current version of DIN VDE 0298-4 always applies.

Please observe all applicable conversion factors going beyond table 12-1 for:
- differing ambient temperature: table 12-2
- several-core cables up to 10mm² with more than 3 cores under load: table 12-3
- heat-resistant cables for ambient temperatures exceeding 50 °C: table 12-4
- for wound cables: table 12-5
- bundling of single-core or multi-core cables in pipes, ducts, walls or flooring: table 12-6
- bundling of multi-core cables on troughs or conduits: table 12-7
- bundling of single-core cables on troughs or conduits: table 12-8

Note for Low-voltage electrical installations – Protection for safety – Protection against overcurrent:

According to HD 60364-4-43: 2010 and DIN VDE 0100-430 (VDE 0100-430): 2010-10 (IEC 60364-4-43: 2008, modified + Corrigendum Oct. 2008)

According to the above-mentioned standard, the requirements for the protection of live conductors from the effects of overcurrents must be observed. This standard describes how live conductors are protected by one or more devices for the automatic disconnection of the supply in the event of overload and short-circuit.

Please also observe all applicable current ratings going beyond table 12-1 for:
- Flexible cables with cross-linked Elastomer insulation for industrial applications: table 12-9
- Welding cable H01N2-D: table 12-10
- Operating current and power loss of copper conductors: table 12-11
- Current rating for cables in the USA: see NEC excerpt in table 13
- Cables for fixed installation in buildings: see DIN VDE 0298 part 4, 2013-06, table 3 and 4
- ESUY earthing cable: see DIN VDE 0105-1
- Cables in machinery: see DIN EN 60204-1/VDE 0113-1

Table 12-2: conversion factors

For ambient temperatures other than +30 °C. The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 17.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Permissible/recommended operating temperature at the conductor (Details of the maximum value in °C can be found in the field "Technical data, temperature range for fixed or flexible installation" on the relevant product page in the catalogue)					
	60 °C	70 °C	80 °C	85 °C	90 °C
Ambient temperature in °C	Conversion factors to be applied to the current rating values in T12-1				
30	1.00	1.00	1.00	1.00	1.00
40	0.82	0.87	0.89	0.90	0.91
50	0.58	0.71	0.77	-	0.82
60	-	0.50	0.63	-	0.71
70	-	-	0.45	-	0.58
80	-	-	-	-	0.41

Table 12-3: conversion factors

For several-core cables with conductor cross-sections up to 10 mm². The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 26.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Number of cores under load	Conversion factor for installation in the open air	Conversion factor for installation underground
5	0.75	0.70
7	0.65	0.60
10	0.55	0.50
14	0.50	0.45
24	0.40	0.35

Table 12-4: conversion factors for heat-resistant cables

The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 18.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Permissible/recommended operating temperature at the conductor (Details of the maximum value in °C can be found in the field "Technical data, temperature range for fixed or flexible installation" on the relevant product page in the catalogue)				
	90 °C	110 °C	135 °C	180 °C
Ambient temperature in °C	Conversion factors to be applied to the current rating values for heat-resistant cables in T 12-1, column A, C or D.			
up to 50	1.00	1.00	1.00	1.00
75	0.61	1.00	1.00	1.00
85	0.35	0.91	1.00	1.00
105	-	0.41	0.87	1.00
130	-	-	0.35	1.00
175	-	-	-	0.41

Table 12-5: conversion factors for wound cables

The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 27.

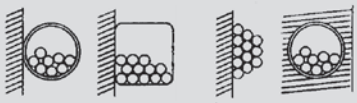
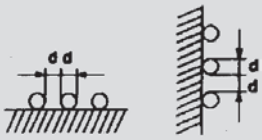
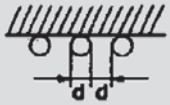
Number of layers on the coil, drum, reel	1	2	3	4	5
Conversion factor	0.80	0.61	0.49	0.42	0.38

A conversion factor of 0.8 applies to spiral winding (in one layer).

Table 12-6: conversion factors

For bundling on walls, in pipes and ducts, on flooring and under ceilings. The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 21.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Configuration for installation	Number of multi-core cables or number of AC or three-phase circuits formed by single-core cables (2 or 3 live conductors)					
	1	2	3	4	6	10
	Conversion factors to be applied to the current rating values in table 12-1					
Bundled directly on the wall, on the floor, in pipes or ducts for electrical installations. 	1.00	0.80	0.70	0.65	0.57	0.48
In a single layer on the wall or floor, touching. 	1.00	0.85	0.79	0.75	0.72	0.70
In a single layer on the wall or floor, with a gap equal to outer diameter d. 	1.00	0.94	0.90	0.90	0.90	0.90
In a single layer under the ceiling, touching. 	0.95	0.81	0.72	0.68	0.64	0.61
In a single layer under the ceiling, with a gap equal to outer diameter d. 	0.95	0.85	0.85	0.85	0.85	0.85

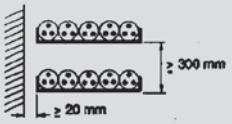
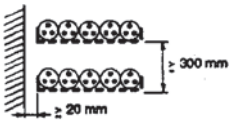
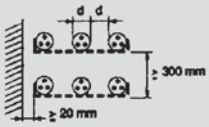
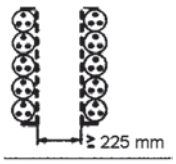
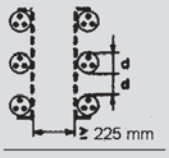
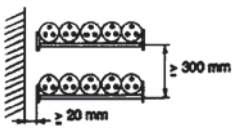
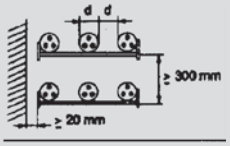
○ = Symbol for single-core or multi-core cable

IMPORTANT: The conversion factors must be applied in order to determine the current rating for cables of the same type and under the same load, when bundled in the same installation type. In the process, the nominal conductor cross-sections must not vary by more than one cross-section classification.

Table 12-7: conversion factors

For bundling multi-core cables on troughs and conduits. The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 22.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

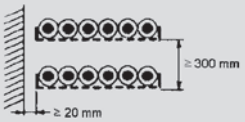
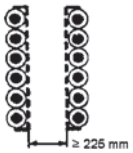
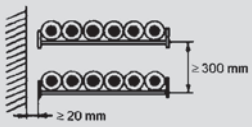
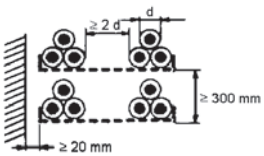
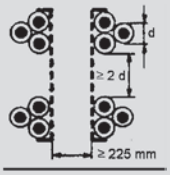
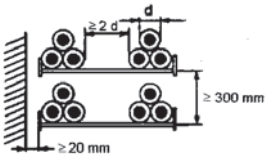
Configuration for installation			Number of troughs or conduits	Number of multi-core cables					
				1	2	3	4	6	9
				Conversion factors					
Non-perforated cable troughs	touching		1	0.97	0.84	0.78	0.75	0.71	0.68
Perforated cable troughs	touching		1	1.00	0.88	0.82	0.79	0.76	0.73
	with gap		1	1.00	1.00	0.98	0.95	0.91	–
	touching		1	1.00	0.88	0.82	0.78	0.73	0.72
	with gap		1	1.00	0.91	0.89	0.88	0.87	–
Cable conduits	touching		1	1.00	0.87	0.82	0.80	0.79	0.78
	with gap		1	1.00	1.00	1.00	1.00	1.00	–

IMPORTANT: The factors stated in this table apply only to groups of cables installed in a single layer in configurations as specified above. However, they do not apply if the cables are touching and installed over one another, or if the actual gap dimensions between the cable troughs or cable conduits fall short of the specified gaps. If this is the case, reduce the conversion factors (e.g. as per table 12-6).

Table 12-8: conversion factors

For bundling single-core cables on troughs and conduits. The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 23.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

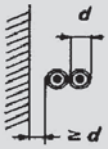
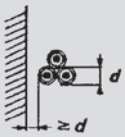
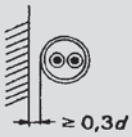
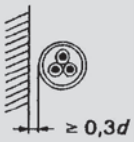
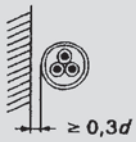
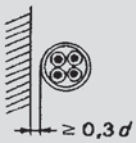
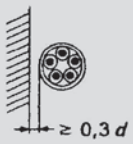
Configuration for installation			Number of troughs or conduits	Number of 3-pin circuits formed by single-core cables			
				1	2	3	To be used as the multiplier for the measurement value of:
				Conversion factors			
Perforated cable troughs	touching		1	0.98	0.91	0.87	Three cables arranged horizontally and level
	touching		1	0.96	0.86	–	Three cables arranged vertically and level
Cable conduits	touching		1	1.00	0.97	0.96	Three cables arranged horizontally and level
Perforated cable troughs			1	1.00	0.98	0.96	Three cables arranged in a horizontal, triangular configuration
			1	1.00	0.91	0.89	Three cables arranged in a vertical, triangular configuration
Cable conduits			1	1.00	1.00	1.00	Three cables arranged in a horizontal, triangular configuration

IMPORTANT: The factors stated in this table apply only to groups of single-core cables installed in a single layer in configurations as specified above. However, they do not apply if the cables are touching and installed over one another, or if the actual gap dimensions between the cable troughs or cable conduits fall short of the specified gaps. If this is the case, reduce the conversion factors (e.g. as per table 12-6). If circuits are connected in parallel, each three-conductor bundle of the parallel connection is to be considered as one circuit.

Table 12-9: current rating of rubber-sheathed cables

Current rating of flexible cables with cross-linked Elastomer insulation for industrial applications (H07RN-F and A07RN-F).
The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 13.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Permissible operating temperature at the conductor: 60 °C							
Ambient temperature: 30 °C							
Installation type: in the open air							
Number of cores under load	**2**	**3**	**2**	**2**	**3**	**3**	**3**
Nominal cross-section of copper cond. in mm²	**Rating A**						
1	-	-	15	15.5	12.5	13	13.5
1.5	19	16.5	18.5	19.5	15.5	16	16.5
2.5	26	22	25	26	21	22	23
4	34	30	34	35	29	30	30
6	43	38	43	44	36	37	38
10	60	53	60	62	51	52	54
Conversion factors for:							
Differing ambient temperature	see table T 12-2						
Bundling	-	T 12-8			T 12-7		
Wound cables	-	-			T 12-5		
Several-core cables	-				T 12-3	-	

Conversion factors for other ambient temperatures for heat-resistant cables with cross-linked Elastomer insulation.
The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 18.1.

Ambient temperature in °C	Permissible operating temperature: 90 °C Conversion factors to be applied to the current rating values in table 12-9
up to 60	1.00
75	0.71
80	0.58
85	0.41

Table 12-10: operating conditions and ratings for welding cables

H01N2-D and H01N2-E

The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 16.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Permissible operating temperature at the conductor 85 °C							
Ambient temperature: 30 °C							
Installation type: in the open air							
Number of cores under load	1						
Mode of operation	**Continuous operation**	**Intermittent operation**					
Run time	-	5 minutes					
Switch-on duration (ED)	100 %	85 %	80 %	60 %	35 %	20 %	8 %
Nominal cross-section of copper cond. in mm²	**Rating A**						
10	96	97	98	102	114	137	198
16	130	132	134	142	166	204	301
25	173	179	181	196	234	293	442
35	216	226	229	250	304	384	584
50	274	287	293	323	398	508	779
Mode of operation	**Continuous operation**	**Intermittent operation**					
Run time	-	10 minutes					
Switch-on duration (ED)	100 %	85 %	80 %	60 %	35 %	20 %	8 %
Nominal cross-section of copper cond. in mm²	**Rating A**						
10	96	96	96	97	102	113	152
16	130	131	131	133	144	167	233
25	173	175	176	182	204	244	351
35	216	220	222	233	268	324	477
50	274	281	284	303	356	439	654
Conversion factors for differing ambient temperature	Table T 12-2						

Table 12-11: operating current and power loss of copper conductors

The illustration is taken out of DIN EN 61439-1 (VDE 0660-600-1), 2012-06, Annex H.

The following table provides reference values for operating currents and power losses of conductors inside an assembly of switchgears and control-gears under idealised conditions. The computational methods used to create the values are given in order to calculate values for other conditions.

For copyright reasons, only excerpts from DIN EN 61439-1 can be mapped at this point.

Operating current and power loss of single copper conductors with a permissible conductor temperature of 70 °C
(ambient temperature inside of assemblies of switchgears and controlgears: 55 °C)

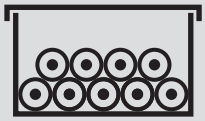
Configuration for installation	 Single-core cable, in a conduit, on walls, arranged horizontally. 6 cables (2 three-phase circuits) continously charged		 Single-core cable, touching, installed in the open air or on a perforated cable trough. 6 cables (2 three-phase circuits) continously charged		Gap of at least one cable diameter  Single-core cable, installed horizontally in the open air with a specified gap	
Conductor cross section	Conductor resistance at 20 °C, R_{20} [a]	Max. operating current I_{max} [b]	Power loss per core P_v	Max. operating current I_{max} [b]	Power loss per core P_v	Max. operating current I_{max} [b]	Power loss per core P_v
mm²	mΩ/m	A	W/m	A	W/m	A	W/m
1.5	12.1	8	0.8	9	1.3	15	3.2
2.5	7.41	10	0.9	13	1.5	21	3.7
4	4.61	14	1.0	18	1.7	28	4.2
6	3.08	18	1.1	23	2.0	36	4.7
10	1.83	24	1.3	32	2.3	50	5.4

Table 12-12: rated short circuit current densities for cables with copper and aluminum conductors

The values given in the table below are reference values and in a simplified form took out of the DIN VDE 0298 part 4, 2013-06, table 28.

For copyright reasons, only excerpts from DIN VDE 0298 part 4 can be mapped at this point.

Insulation material	Permissible operating temperatur at the conductor	Permissible short circuit temperature ϑ_e	Conductor temperature at the beginning of the short circuit ϑ_a in °C									
			180	135	110	90	80	70	60	50	40	30
			rated short circuit current density J_{thr} for 1 s									
	°C	°C	A/mm²									
Copper conductor												
EPR*	60	250**							159	165	170	176
PVC:												
flexible cable up to 300mm²	70	150						109	117	124	131	138
cables for fixed installation:												
up to 300 mm²	70	160						115	122	129	136	143
above 300 mm²	70	140						103	111	118	126	133
PVC, heat-resistant	90	150				93	101	109	117	124	131	138
Silicone rubber	180	350**	132	153	164	173	178	182	187	192	196	201
Tinned conductor		200	49	91	109	122	128	135	141	147	153	159
Aluminium conductor												
PVC cable												
up to 300 mm²	70	160						76	81	85	90	95
above 300 mm²	70	140						68	73	78	83	88

* Ethylene-Propylene-rubber (EPR) or Ethylene Propylene Diene rubber (EPDM)
** For tinned conductors the temperatur is limited to +200°C, for soft solder connection it is limited to +160°C.