سلطة إقليم البترا التنموي السياحي

PETRA DEVELOPMENT AND TOURISM REGION AUTHORITY

WADI MUSA CITY CENTER

DESIGN AND ENGINEERING SERVICES

VOLTAGE DROP CALCULATIONS

MAY 2014

CONSOLIDATED CONSULTANTS GROUP



INNOVATIVE SOLUTIONS...PROVEN EXCELLENCE

DESIGN MANAGEMENT SERVICES SPECIALIZED STUDIES

Network

Earthing arrangement:	TT
Voltage:	400 V
Max. permissible CSA:	630.0 mm²
CSA N / CSA Ph:	1
CSA tolerance:	5.0 %
Target power factor:	0.85
System frequency:	50 Hz

Circuit : POWER SOURCE (W1-C1 -Q1) - Calculated

Upstream :
Downstream : MDB-MTR
Voltage : 400

LV Source : W1

Source:	Private substation	Service connection current:	543 A
Max. short-circuit current:	20.0 kA	Min. short-circuit current:	18.1 kA
Earthing arrangement:	TT		

Cable : C1

Length:	120.0 m		
Installation method:	D-no mechanical protection; circuits touching Single-core cables directly buried		
Cable type:	Single-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Trefoil		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	701.2 A
Iz x correction factors (real conditions of use):	539.9 A

Sizing constraint: overloads

Correction :	Temperature	: 0.93	(52-D2)
	x Soil thermal resistivity	: 1.10	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 0.75	(52-E2)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		0.77	

CSA (mm²)	theoretical	used	reference	metal
Per phase	2 x 222.3	2 x 240.0		Copper
Neutral	2 x 222.3	2 x 240.0		Copper
PE	1 x 16.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	0.00	1.7783	1.78

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)		**13.1638**	**11.4002**	**9.7996**	**9.8029**	**8.2350**	**0.0226**
R (mΩ)		14.8120	29.6239	19.4395	32.2153	22.0309	193.8037
X (mΩ)		12.4383	24.8767	17.2383	24.8767	17.2383	22.0383
Z (mΩ)		19.3418	38.6837	25.9818	40.7023	27.9736	195.0527

Circuit breaker: Q1

Name:	NS630N>03/2004-50.0 kA	Frame rating (In):	630 A
Trip unit rating:	630.00 A	Trip unit:	STR23SE
Number of poles:	4P4d		
Discrimination limit:			
BC reinforced by cascading:			
Earth leakage protection:	Yes		
Earth leakage protection device :	Vigi MB		
Sensitivity :	10000.00 mA		
Delay :	310 ms		

Settings:

Overload:	Ir = 1.00 x 0.88 In = 554.40 A
Magnetic:	Im(Isd) = 10.0 x Ir = 5544.00 A
	tm = 60 ms

Circuit : **MDB-MTR (B1) - Calculated**

Upstream :	POWER SOURCE
Downstream :	SMDB1-
Voltage :	400

Busbars: **B1**

Designation:	Linergy 800	Dimensions:	0.0 m-1// 0.0 mmx0 mm
Type :		Metal:	
Ambient temperature:	35 °C	I available:	750 A
Short-circuit temperature:	85 °C	Isc max:	13.16 kA
Ks :	0.81	Peak Isc (kÂ) :	26.33 kA
Voltage drop:	0.0000 %		

Circuit : SMDB1- (Q53-C53) - Calculated

Upstream : MDB-MTR
Downstream : SMDB1
Voltage : 400

Circuit breaker: Q53

Name:	NS160N-36.0 kA	Frame rating (In):	160 A
Trip unit rating:	125.00 A	Trip unit:	TM-D
Number of poles:	4P4d		
Discrimination limit:	T		
BC reinforced by cascading:	50.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 0.90 In = 112.50 A
Magnetic: Im(Isd) = 1250 A

Cable : C53

Length:	8.0 m		
Installation method:	F-touching, in a ribbon cable Single-core cables on perforated vertical shelves		
Cable type:	Single-core	Number of layers:	1
Insulation:	PVC	Nb additional touching circuits:	0
Arrangement of conductors:	Trefoil		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	137.0 A
Iz x correction factors (real conditions of use):	137.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E5)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 24.0	1 x 35.0		Copper
Neutral	1 x 24.0	1 x 35.0		Copper
PE	1 x 16.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.78	0.2117	1.99

Thermal stress check:
Energy received by the phase conductor : 302184 A²s
Permitted thermal stress : 16200625 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**13.1638**	**11.0215**	**9.5449**	**7.6032**	**8.0132**	**6.2039**	**0.0230**
R (mΩ)	14.8120	19.0428	38.0856	27.9012	42.3694	32.1849	32.2907
X (mΩ)	12.4383	13.0783	26.1567	18.5183	26.1567	18.5183	13.7183
Z (mΩ)	19.3418	23.1013	46.2027	33.4874	49.7930	37.1321	35.0839

Load

I:	105.08 A	Polarity of circuit:	3P+N
P:	61.89 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : SMDB1 (Q94) - Calculated

Upstream : SMDB1-
Downstream : SMDB1-BUS
Voltage : 400

Circuit breaker: Q94

Name:	EZC250N-25.0 kA	Frame rating (In):	250 A
Trip unit rating:	125.00 A	Trip unit:	TM Fixed
Number of poles:	4P3d		
Discrimination limit:			
BC reinforced by cascading:	36.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:

Overload:	Ir = 125.0 A
Magnetic:	Im(Isd) = 1250 A

MC30

Load

I:	105.08 A	Polarity of circuit:	3P+N
P:	61.89 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : **SMDB1-BUS (B17) - Calculated**

Upstream :	SMDB1
Downstream :	DB-G-SH1
Voltage :	400

Busbars: **B17**

Designation:	Linergy 800	Dimensions:	0.0 m-1// 0.0 mmx0 mm
Type :		Metal:	
Ambient temperature:	35 °C	I available:	750 A
Short-circuit temperature:	85 °C	Isc max:	11.02 kA
Ks :	1.00	Peak Isc (kÂ) :	22.04 kA
Voltage drop:	0.0000 %		

Circuit : DB-G-SH1 (Q68-C68-L68) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q68

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C68

Length:	99.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.9997	3.99

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**0.9821**		**0.7041**	**0.0223**
R (mΩ)	19.0428			256.9624		325.3833	325.4891
X (mΩ)	13.0783			34.3583		34.3583	29.5583
Z (mΩ)	23.1013			259.2492		327.1923	326.8285

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH2 (Q69-C69-L69) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q69

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C69

Length:	95.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.9189	3.91

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.0185**		**0.7305**	**0.0223**
R (mΩ)	19.0428			247.7074		313.5369	313.6427
X (mΩ)	13.0783			33.7183		33.7183	28.9183
Z (mΩ)	23.1013			249.9918		315.3448	314.9730

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH3 (Q70-C70-L70) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q70

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C70

Length:	91.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.8381	3.83

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.0576**		**0.7590**	**0.0224**
R (mΩ)	19.0428			238.4524		301.6905	301.7963
X (mΩ)	13.0783			33.0783		33.0783	28.2783
Z (mΩ)	23.1013			240.7358		303.4985	303.1182

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH4 (Q71-C71-L71) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q71

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C71

Length:	87.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.7573	3.75

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.0999**		**0.7899**	**0.0224**
R (mΩ)	19.0428			229.1974		289.8441	289.9499
X (mΩ)	13.0783			32.4383		32.4383	27.6383
Z (mΩ)	23.1013			231.4815		291.6536	291.2642

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH5 (Q72-C72-L72) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q72

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C72

Length:	83.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.6765	3.67

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.1457**		**0.8233**	**0.0224**
R (mΩ)	19.0428			219.9424		277.9977	278.1035
X (mΩ)	13.0783			31.7983		31.7983	26.9983
Z (mΩ)	23.1013			222.2291		279.8104	279.4109

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH6 (Q73-C73-L73) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q73

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C73

Length:	79.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.5957	3.59

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.1955**		**0.8597**	**0.0224**
R (mΩ)	19.0428			210.6874		266.1513	266.2571
X (mΩ)	13.0783			31.1583		31.1583	26.3583
Z (mΩ)	23.1013			212.9789		267.9689	267.5586

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH7 (Q74-C74-L74) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q74

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C74

Length:	75.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined
Correction :

Temperature	: 1.00	(52-D1)
x Soil thermal resistivity	: 1.00	(A.52-16)
x Neutral loaded	: 1.00	(D.52-1)
x touching conductors	: 1.00	(52-E1)
x User	: 1.00	
/ Protection)	: 1.00	(§433.1)
	1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.5149	3.50

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.2497**		**0.8994**	**0.0225**
R (mΩ)	19.0428			201.4324		254.3049	254.4107
X (mΩ)	13.0783			30.5183		30.5183	25.7183
Z (mΩ)	23.1013			203.7311		256.1296	255.7073

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH8 (Q75-C75-L75) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q75

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C75

Length:	71.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.4341	3.42

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.3091**		**0.9430**	**0.0225**
R (mΩ)	19.0428			192.1774		242.4585	242.5643
X (mΩ)	13.0783			29.8783		29.8783	25.0783
Z (mΩ)	23.1013			194.4862		244.2925	243.8573

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH9 (Q76-C76-L76) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q76

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C76

Length:	67.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.3533	3.34

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.3745**		**0.9910**	**0.0225**
R (mΩ)	19.0428			182.9224		230.6121	230.7179
X (mΩ)	13.0783			29.2383		29.2383	24.4383
Z (mΩ)	23.1013			185.2444		232.4582	232.0086

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH10 (Q77-C77-L77) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q77

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C77

Length:	63.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.2725	3.26

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.4466**		**1.0441**	**0.0225**
R (mΩ)	19.0428			173.6674		218.7657	218.8715
X (mΩ)	13.0783			28.5983		28.5983	23.7983
Z (mΩ)	23.1013			176.0063		220.6270	220.1615

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH11 (Q78-C78-L78) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q78

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C78

Length:	59.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.8836	3.87

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.0271**		**0.7360**	**0.0223**
R (mΩ)	19.0428			246.3192		311.7600	311.8657
X (mΩ)	13.0783			27.9583		27.9583	23.1583
Z (mΩ)	23.1013			247.9008		313.0111	312.7244

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH12 (Q79-C79-L79) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q79

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C79

Length:	55.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	68.7 A
Iz x correction factors (real conditions of use):	68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.7109	3.70

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**1.0922**		**0.7833**	**0.0224**
R (mΩ)	19.0428			231.5112		292.8057	292.9115
X (mΩ)	13.0783			27.3183		27.3183	22.5183
Z (mΩ)	23.1013			233.1174		294.0773	293.7758

Load

I:	17.47 A	Polarity of circuit:	1P
P:	3.43 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH13 (Q80-C80-L80) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q80

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C80

Length:	66.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	68.7 A
Iz x correction factors (real conditions of use):	68.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.0353	3.03

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**0.9300**		**0.6655**	**0.0223**
R (mΩ)	19.0428			272.2332		344.9299	345.0356
X (mΩ)	13.0783			29.0783		29.0783	24.2783
Z (mΩ)	23.1013			273.7818		346.1534	345.8887

Load

I:	8.81 A	Polarity of circuit:	1P
P:	1.73 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH14 (Q81-C81-L81) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q81

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C81

Length:	62.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	0.9726	2.96

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**0.9831**		**0.7040**	**0.0223**
R (mΩ)	19.0428			257.4252		325.9756	326.0814
X (mΩ)	13.0783			28.4383		28.4383	23.6383
Z (mΩ)	23.1013			258.9913		327.2137	326.9371

Load

I:	8.81 A	Polarity of circuit:	1P
P:	1.73 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SH15 (Q67-C67-L67) - Calculated

Upstream : SMDB1-BUS
Downstream :
Voltage : 400

Circuit breaker: Q67

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C67

Length:	62.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.99	1.7884	3.78

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.0215**			**0.9831**		**0.7040**	**0.0223**
R (mΩ)	19.0428			257.4252		325.9756	326.0814
X (mΩ)	13.0783			28.4383		28.4383	23.6383
Z (mΩ)	23.1013			258.9913		327.2137	326.9371

Load

I:	16.20 A	Polarity of circuit:	1P
P:	3.18 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : SMDB2- (Q66-C66) - Calculated

Upstream : MDB-MTR
Downstream : SMDB-2
Voltage : 400

Circuit breaker: Q66

Name: NS100N>03/2004-36.0 kA Frame rating (In): 100 A
Trip unit rating: 100.00 A Trip unit: TM-D
Number of poles: 4P4d
Discrimination limit: T
BC reinforced by cascading: 50.0 kA
Earth leakage protection: No
Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 0.80 In = 80.00 A
Magnetic: Im(Isd) = 800 A

Cable : C66

Length: 5.0 m
Installation method: F-touching, in a ribbon cable
Single-core cables on perforated vertical shelves
Cable type: Single-core Number of layers: 1
Insulation: PVC Nb additional touching circuits: 0
Arrangement of conductors: Trefoil
Ambient temperature: 30 °C THDI level: 0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 137.0 A
Iz x correction factors (real conditions of use): 137.0 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E5)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 14.3	1 x 35.0		Copper
Neutral	1 x 14.3	1 x 35.0		Copper
PE	1 x 16.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.78	0.0718	1.85

Thermal stress check:
Energy received by the phase conductor : 302184 A²s
Permitted thermal stress : 16200625 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**13.1638**	**11.7501**	**10.1758**	**8.3184**	**8.6125**	**6.8509**	**0.0230**
R (mΩ)	14.8120	17.4562	34.9125	24.7280	38.5616	28.3771	26.2221
X (mΩ)	12.4383	12.8383	25.6767	18.0383	25.6767	18.0383	13.2383
Z (mΩ)	19.3418	21.6689	43.3379	30.6081	46.3281	33.6250	29.3743

Load

I: 56.98 A Polarity of circuit: 3P+N
P: 33.56 kW Earthing arrangement: TT
Power factor 0.85 Phase distribution: -
Ku: 1.0
Number of identical circuits: 1

Circuit : SMDB-2 (Q102) - Calculated

Upstream : SMDB2-
Downstream : SMDB2-BUS
Voltage : 400

Circuit breaker: Q102

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	63.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:			
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :		-	
Sensitivity :		-	
Delay :		-	

Settings:

Overload:	Ir = 63.0 A
Magnetic:	Im(Isd) = 252 A

MC30

Load

I:	56.98 A	Polarity of circuit:	3P+N
P:	33.56 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : **SMDB2-BUS (B22) - Calculated**

Upstream :	SMDB-2
Downstream :	DB-F-SH1
Voltage :	400

Busbars: **B22**

Designation:	Linergy 800	Dimensions:	0.0 m-1// 0.0 mmx0 mm
Type :		Metal:	
Ambient temperature:	35 °C	I available:	750 A
Short-circuit temperature:	85 °C	Isc max:	11.75 kA
Ks :	1.00	Peak Isc (kÂ) :	23.50 kA
Voltage drop:	0.0000 %		

Circuit : DB-F-SH1 (Q83-C83-L83) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q83

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C83

Length:	86.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	91.0 A
Iz x correction factors (real conditions of use):	91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.7371	3.59

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.1268**		**0.8087**	**0.0224**
R (mΩ)	17.4562			223.7105		283.0747	280.9197
X (mΩ)	12.8383			31.7983		31.7983	26.9983
Z (mΩ)	21.6689			225.9591		284.8551	282.2141

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH2 (Q83-C83-L83) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q83

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C83

Length:	82.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.6563	3.51

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.1749**		**0.8438**	**0.0224**
R (mΩ)	17.4562			214.4555		271.2283	269.0733
X (mΩ)	12.8383			31.1583		31.1583	26.3583
Z (mΩ)	21.6689			216.7072		273.0121	270.3612

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH3 (Q84-C84-L84) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q84

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C84

Length:	78.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.5755	3.43

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.2273**		**0.8820**	**0.0225**
R (mΩ)	17.4562			205.2005		259.3819	257.2269
X (mΩ)	12.8383			30.5183		30.5183	25.7183
Z (mΩ)	21.6689			207.4575		261.1711	258.5094

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH4 (Q85-C85-L85) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q85

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C85

Length:	74.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.4947	3.34

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.2846**		**0.9239**	**0.0225**
R (mΩ)	17.4562			195.9455		247.5355	245.3805
X (mΩ)	12.8383			29.8783		29.8783	25.0783
Z (mΩ)	21.6689			198.2104		249.3322	246.6587

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH5 (Q86-C86-L86) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q86

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C86

Length:	70.0 m		
Installation method:	A2-in insulating partitions Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 75.9 A
Iz x correction factors (real conditions of use): 75.9 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.5	1 x 16.0		Copper
Neutral	1 x 3.5	1 x 16.0		Copper
PE	1 x 4.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.4139	3.26

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.3474**		**0.9700**	**0.0225**
R (mΩ)	17.4562			186.6905		235.6891	233.5341
X (mΩ)	12.8383			29.2383		29.2383	24.4383
Z (mΩ)	21.6689			188.9662		237.4957	234.8093

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH6 (Q87-C87-L87) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q87

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C87

Length:	66.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 91.0 A
Iz x correction factors (real conditions of use): 91.0 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 16.0		Copper
Neutral	1 x 2.6	1 x 16.0		Copper
PE	1 x 2.5	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.3331	3.18

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 5234944 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**MC1-1**			**1.4167**		**1.0208**	**0.0225**
R (mΩ)	MC2-117.45622		177.4355		223.8427	221.6877	
X (mΩ)	12.8383			28.5983		28.5983	23.7983
Z (mΩ)	21.6689			179.7254		225.6622	222.9614

Load

I:	MC1	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	MC20.85ase distribution:		Phase2/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH7 (Q88-C88-L88) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q88

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C88

Length:	62.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.9794	3.83

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**0.9954**		**0.7124**	**0.0223**
R (mΩ)	17.4562			254.2520		322.1679	320.0128
X (mΩ)	12.8383			27.9583		27.9583	23.1583
Z (mΩ)	21.6689			255.7846		323.3788	320.8497

Load

I:	17.93 A	Polarity of circuit:	1P
P:	3.52 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SH8 (Q89-C89-L89) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q89

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C89

Length:	58.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.8042	3.65

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.0565**		**0.7567**	**0.0224**
R (mΩ)	17.4562			239.4440		303.2136	301.0585
X (mΩ)	12.8383			27.3183		27.3183	22.5183
Z (mΩ)	21.6689			240.9973		304.4417	301.8995

Load

I:	17.47 A	Polarity of circuit:	1P
P:	3.43 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : MC1 (MC2Q90-C90-L90 Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q90

Name:	C60a-10.0 kA	Frame rating (In):	40 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C90

Length:	54.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 68.7 A
Iz x correction factors (real conditions of use): 68.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.6	1 x 10.0		Copper
Neutral	1 x 2.6	1 x 10.0		Copper
PE	1 x 2.5	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.3817	3.23

Thermal stress check:
Energy received by the phase conductor : 307200 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**			**1.1255**		**0.8069**	**0.0224**
R (mΩ)	17.4562			224.6360		284.2594	282.1043
X (mΩ)	12.8383			26.6783		26.6783	21.8783
Z (mΩ)	21.6689			226.2146		285.5086	282.9514

Load

I:	14.37 A	Polarity of circuit:	1P
P:	2.82 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase1/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-RES1 (Q91-C91-L91) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q91

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	32.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C91

Length:	106.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 60.4 A
Iz x correction factors (real conditions of use): 60.4 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.2	1 x 10.0		Copper
Neutral	1 x 3.2	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	1.2721	3.12

Thermal stress check:
Energy received by the phase conductor : 57775 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**	**1.1858**	**1.0269**	**0.6082**	**0.7354**	**0.4332**	**0.0219**
R (mΩ)	17.4562	213.6622	427.3245	417.1400	540.8490	530.6645	528.5094
X (mΩ)	12.8383	21.3183	42.6367	34.9983	42.6367	34.9983	30.1983
Z (mΩ)	21.6689	214.7231	429.4463	418.6056	542.5270	531.8173	529.3714

Load

I:	13.48 A	Polarity of circuit:	3P+N
P:	7.94 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-S-SH1 (Q92-C92-L92) - Calculated

Upstream : SMDB2-BUS
Downstream :
Voltage : 400

Circuit breaker: Q92

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	32.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	0.8 kA		
BC reinforced by cascading:	30.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C92

Length:	58.0 m		
Installation method:	B2-in masonry Multi-core cables in ducts		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 44.5 A
Iz x correction factors (real conditions of use): 44.5 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E1)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.2	1 x 6.0		Copper
Neutral	1 x 3.2	1 x 6.0		Copper
PE	1 x 4.0	1 x 6.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.85	0.6914	2.54

Thermal stress check:
Energy received by the phase conductor : 57775 A²s
Permitted thermal stress : 736164 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.7501**	**1.2914**	**1.1184**	**0.6638**	**0.8014**	**0.4728**	**0.0220**
R (mΩ)	17.4562	196.3862	392.7725	382.5880	496.6224	486.4379	484.2829
X (mΩ)	12.8383	17.4783	34.9567	27.3183	34.9567	27.3183	22.5183
Z (mΩ)	21.6689	197.1624	394.3250	383.5621	497.8512	487.2044	484.8061

Load

I:	8.10 A	Polarity of circuit:	3P+N
P:	4.77 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : SMDB-SR- (Q93-C93) - Calculated

Upstream : MDB-MTR
Downstream : SMDB-SR
Voltage : 400

Circuit breaker: Q93

Name:	NR630F-36.0 kA	Frame rating (In):	630 A
Trip unit rating:	630.00 A	Trip unit:	STR23SE
Number of poles:	4P4d		
Discrimination limit:			
BC reinforced by cascading:	50.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 0.80 x 0.98 In = 493.92 A
Magnetic: Im(Isd) = 10.0 x Ir = 4939.20 A
tm = 60 ms

Cable : C93

Length:	10.0 m		
Installation method:	F-touching, in a ribbon cable Single-core cables on perforated vertical shelves		
Cable type:	Single-core	Number of layers:	1
Insulation:	PVC	Nb additional touching circuits:	0
Arrangement of conductors:	Trefoil		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	484.8 A
Iz x correction factors (real conditions of use):	484.8 A

Sizing constraint: overloads

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E5)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 228.4	1 x 240.0		Copper
Neutral	1 x 228.4	1 x 240.0		Copper
PE	1 x 16.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	1.78	0.2557	2.04

Thermal stress check:
Energy received by the phase conductor : 97240500 A²s
Permitted thermal stress : 761760000 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**13.1638**	**12.4521**	**10.7838**	**9.0294**	**9.2478**	**7.5734**	**0.0230**
R (mΩ)	14.8120	15.5832	31.1664	20.9820	34.0663	23.8819	30.9157
X (mΩ)	12.4383	13.2383	26.4767	18.8383	26.4767	18.8383	14.0383
Z (mΩ)	19.3418	20.4472	40.8945	28.1980	43.1454	30.4175	33.9537

Load

I:	488.88 A	Polarity of circuit:	3P+N
P:	287.89 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : SMDB-SR (Q34) - Calculated

Upstream : SMDB-SR-
Downstream : SMDBSR-BUS
Voltage : 400

Circuit breaker: Q34

Name:	NR630F-36.0 kA	Frame rating (In):	630 A
Trip unit rating:	630.00 A	Trip unit:	STR23SE
Number of poles:	4P3d		
Discrimination limit:			
BC reinforced by cascading:	50.0 kA		
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:

Overload:	Ir = 493.9 A
Magnetic:	Im(Isd) = 4939 A
	tm = 60 ms

MC30

Load

I:	488.88 A	Polarity of circuit:	3P+N
P:	287.89 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : **SMDBSR-BUS (B35) - Calculated**

Upstream :	SMDB-SR
Downstream :	UDB-B1
Voltage :	400

Busbars: **B35**

Designation:	Linergy 800	Dimensions:	0.0 m-1// 0.0 mmx0 mm
Type :		Metal:	
Ambient temperature:	35 °C	I available:	750 A
Short-circuit temperature:	85 °C	Isc max:	12.45 kA
Ks :	1.00	Peak Isc (kÂ) :	24.90 kA
Voltage drop:	0.0000 %		

Circuit : UDB-B1 (Q67-C67-L67) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q67

Name:	C60N-20.0 kA	Frame rating (In):	63 A
Trip unit rating:	32.00 A	Trip unit:	C
Number of poles:	2P2d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C67

Length:	40.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	-

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 62.6 A
Iz x correction factors (real conditions of use): 62.6 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 1.9	1 x 6.0		Copper
Neutral	1 x 1.9	1 x 6.0		Copper
PE	1 x 2.5	1 x 6.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	1.0316	3.06

Thermal stress check:
Energy received by the phase conductor : 20600 A²s
Permitted thermal stress : 736164 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**			**0.9466**		**0.6761**	**0.0223**
R (mΩ)	15.5832			267.7820		339.7859	346.8197
X (mΩ)	13.2383			25.2383		25.2383	20.4383
Z (mΩ)	20.4472			268.9687		340.7219	347.4214

Load

I:	8.76 A	Polarity of circuit:	1P
P:	1.72 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	Phase3/Neutral
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-B2-SER (Q82-C82-L82) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q82

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	63.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 63.0 A
Magnetic: Im(Isd) = -

Cable : C82

Length:	43.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 127.4 A
Iz x correction factors (real conditions of use): 127.4 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 7.0	1 x 25.0		Copper
Neutral	1 x 7.0	1 x 25.0		Copper
PE	1 x 10.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.8274	2.86

Thermal stress check:
Energy received by the phase conductor : 1488375 A²s
Permitted thermal stress : 12780625 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**5.0651**	**4.3865**	**2.8777**	**3.3171**	**2.1236**	**0.0227**
R (mΩ)	15.5832	47.4204	94.8408	84.6564	115.5695	105.3851	135.3417
X (mΩ)	13.2383	16.6783	33.3567	25.7183	33.3567	25.7183	20.9183
Z (mΩ)	20.4472	50.2679	100.5358	88.4768	120.2871	108.4779	136.9487

Load

I:	52.42 A	Polarity of circuit:	3P+N
P:	30.87 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-B1-SER (Q95-C95-L95) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q95

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C95

Length:	39.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	1.3177	3.35

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**2.8517**	**2.4697**	**1.5223**	**1.8030**	**1.0960**	**0.0225**
R (mΩ)	15.5832	87.7722	175.5444	165.3600	218.8702	208.6857	215.7195
X (mΩ)	13.2383	16.3583	32.7167	25.0783	32.7167	25.0783	20.2783
Z (mΩ)	20.4472	89.2836	178.5671	167.2509	221.3019	210.1872	216.6705

Load

I:	37.95 A	Polarity of circuit:	3P+N
P:	22.35 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-G-SER (Q96-C96-L96) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q96

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C96

Length:	45.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.9599	2.99

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**2.5385**	**2.1984**	**1.3445**	**1.5987**	**0.9657**	**0.0225**
R (mΩ)	15.5832	98.8782	197.7564	187.5720	247.3015	237.1171	244.1509
X (mΩ)	13.2383	16.8383	33.6767	26.0383	33.6767	26.0383	21.2383
Z (mΩ)	20.4472	100.3017	200.6034	189.3707	249.5840	238.5425	245.0729

Load

I:	23.96 A	Polarity of circuit:	3P+N
P:	14.11 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : DB-F-SER (Q97-C97-L97) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q97

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	32.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 32.0 A
Magnetic: Im(Isd) = -

Cable : C97

Length:	51.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 54.4 A
Iz x correction factors (real conditions of use): 54.4 A

Sizing constraint: user-defined
Correction :

Temperature	: 1.00	(52-D1)
x Soil thermal resistivity	: 1.00	(A.52-16)
x Neutral loaded	: 1.00	(D.52-1)
x touching conductors	: 1.00	(52-E4)
x User	: 1.00	
/ Protection)	: 1.00	(§433.1)
	1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 2.4	1 x 6.0		Copper
Neutral	1 x 2.4	1 x 6.0		Copper
PE	1 x 2.5	1 x 6.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.3594	2.39

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 736164 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**1.4651**	**1.2688**	**0.7561**	**0.9105**	**0.5388**	**0.0221**
R (mΩ)	15.5832	172.9182	345.8364	335.6520	436.8439	426.6595	433.6933
X (mΩ)	13.2383	17.3183	34.6367	26.9983	34.6367	26.9983	22.1983
Z (mΩ)	20.4472	173.7833	347.5666	336.7361	438.2149	427.5129	434.2610

Load

I:	4.79 A	Polarity of circuit:	3P+N
P:	2.82 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : ELEVATOR-1 (Q98-C98-L98) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q98

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C98

Length:	56.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.4233	2.45

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**2.1121**	**1.8291**	**1.1071**	**1.3233**	**0.7928**	**0.0224**
R (mΩ)	15.5832	119.2392	238.4784	228.2940	299.4257	289.2412	296.2750
X (mΩ)	13.2383	17.7183	35.4367	27.7983	35.4367	27.7983	22.9983
Z (mΩ)	20.4472	120.5484	241.0969	229.9802	301.5154	290.5739	297.1663

Load

I:	8.49 A	Polarity of circuit:	3P+N
P:	5.00 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : ELEVATOR-3 (Q99-C99-L99) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q99

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C99

Length:	112.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.8466	2.88

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**1.1367**	**0.9844**	**0.5824**	**0.7043**	**0.4145**	**0.0218**
R (mΩ)	15.5832	222.8952	445.7904	435.6060	564.7850	554.6006	561.6344
X (mΩ)	13.2383	22.1983	44.3967	36.7583	44.3967	36.7583	31.9583
Z (mΩ)	20.4472	223.9978	447.9957	437.1542	566.5273	555.8174	562.5429

Load

I:	8.49 A	Polarity of circuit:	3P+N
P:	5.00 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : SPEL-1 (Q100-C100-L100) - Calculated

Upstream : SMDBSR-BUS
Downstream :
Voltage : 400

Circuit breaker: Q100

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C100

Length:	41.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	54.4 A
Iz x correction factors (real conditions of use):	54.4 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 6.0		Copper
Neutral	1 x 3.4	1 x 6.0		Copper
PE	1 x 4.0	1 x 6.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.5061	2.54

Thermal stress check:
Energy received by the phase conductor : 60092 A²s
Permitted thermal stress : 736164 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**1.7802**	**1.5417**	**0.9254**	**1.1102**	**0.6608**	**0.0222**
R (mΩ)	15.5832	142.0682	284.1364	273.9520	357.8679	347.6835	354.7173
X (mΩ)	13.2383	16.5183	33.0367	25.3983	33.0367	25.3983	20.5983
Z (mΩ)	20.4472	143.0253	286.0506	275.1268	359.3896	348.6099	355.3149

Load

I:	8.39 A	Polarity of circuit:	3P+N
P:	4.94 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : ESMDB- (Q101-C101) - Calculated

Upstream : SMDBSR-BUS
Downstream : ESMDB-B1
Voltage : 400

Circuit breaker: Q101

Name:	NR400F-36.0 kA	Frame rating (In):	400 A
Trip unit rating:	400.00 A	Trip unit:	STR23SE
Number of poles:	4P4d		
Discrimination limit:			
BC reinforced by cascading:	50.0 kA		
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 1.00 x 0.85 In = 340.00 A
Magnetic: Im(Isd) = 10.0 x Ir = 3400.00 A
tm = 60 ms

Cable : C101

Length:	7.0 m		
Installation method:	F-touching, in a ribbon cable Single-core cables on perforated vertical shelves		
Cable type:	Single-core	Number of layers:	1
Insulation:	PVC	Nb additional touching circuits:	0
Arrangement of conductors:	Trefoil		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	484.8 A
Iz x correction factors (real conditions of use):	484.8 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E5)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 129.3	1 x 240.0		Copper
Neutral	1 x 129.3	1 x 240.0		Copper
PE	1 x 16.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.03	0.1229	2.15

Thermal stress check:
Energy received by the phase conductor : 39200000 A²s
Permitted thermal stress : 761760000 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**12.4521**	**11.9979**	**10.3905**	**8.5584**	**8.8952**	**7.1700**	**0.0229**
R (mΩ)	15.5832	16.1231	32.2462	22.0617	35.3620	25.1776	41.2813
X (mΩ)	13.2383	13.7983	27.5967	19.9583	27.5967	19.9583	15.1583
Z (mΩ)	20.4472	21.2214	42.4428	29.7498	44.8559	32.1286	43.9764

Load

I:	335.63 A	Polarity of circuit:	3P+N
P:	197.64 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : ESMDB-B1 (Q103) - Calculated

Upstream : ESMDB-
Downstream : ESMDB-BUS
Voltage : 400

Circuit breaker: Q103

Name: NS400N>03/2004-50.0 kA
Frame rating (In): 400 A
Trip unit rating: 400.00 A
Trip unit: STR23SE
Number of poles: 4P3d
Discrimination limit:
BC reinforced by cascading:
Earth leakage protection: No
Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 340.0 A
Magnetic: Im(Isd) = 3400 A
tm = 60 ms

MC30

Load

I: 335.63 A
P: 197.64 kW
Power factor 0.85
Number of identical circuits: 1
Polarity of circuit: 3P+N
Earthing arrangement: TT
Phase distribution: -
Ku: 1.0

Circuit : **ESMDB-BUS (B46) - Calculated**

Upstream :	ESMDB-B1
Downstream :	EMCC-1
Voltage :	400

Busbars: **B46**

Designation:	Linergy 800	Dimensions:	0.0 m-1// 0.0 mmx0 mm
Type :		Metal:	
Ambient temperature:	35 °C	I available:	750 A
Short-circuit temperature:	85 °C	Isc max:	12.00 kA
Ks :	1.00	Peak Isc (kÂ) :	24.00 kA
Voltage drop:	0.0000 %		

Circuit : EMCC-1 (Q69-C69-L69) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q69

Name:	NG125N-25.0 kA	Frame rating (In):	125 A
Trip unit rating:	125.00 A	Trip unit:	C
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		
Earth leakage protection device :	-		
Sensitivity :	-		
Delay :	-		

Settings:
Overload: Ir = 125.0 A
Magnetic: Im(Isd) = -

Cable : C69

Length:	101.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A):	245.6 A
Iz x correction factors (real conditions of use):	245.6 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 22.4	1 x 70.0		Copper
Neutral	1 x 22.4	1 x 70.0		Copper
PE	1 x 16.0	1 x 35.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	1.5016	3.66

Thermal stress check:
Energy received by the phase conductor : 6250000 A²s
Permitted thermal stress : 100200100 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**5.2940**	**4.5847**	**3.0429**	**3.5440**	**2.2972**	**0.0227**
R (mΩ)	16.1231	42.8304	85.6607	75.4763	103.7327	93.5482	143.8372
X (mΩ)	13.7983	21.8783	43.7567	36.1183	43.7567	36.1183	31.3183
Z (mΩ)	21.2214	48.0947	96.1894	83.6732	112.5838	100.2786	147.2073

Load

I:	104.09 A	Polarity of circuit:	3P+N
P:	61.30 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : EMCC-2 (Q95-C95-L95) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q95

Name: NG125N-25.0 kA
Frame rating (In): 125 A
Trip unit rating: 125.00 A
Trip unit: C
Number of poles: 4P3d
Discrimination limit: T
BC reinforced by cascading:
Earth leakage protection: No
Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 125.0 A
Magnetic: Im(Isd) = -

Cable : C95

Length: 145.0 m
Installation method: E-circuits touching
Multi-core cables on perforated horizontal shelves
Cable type: Multi-core
Number of layers: 1
Insulation: XLPE
Nb additional touching circuits: 0
Arrangement of conductors: Touching, flat
Ambient temperature: 30 °C
THDI level: 0 %

Permitted current by the cable (Iz):

Iz under normal conditions of use (A): 245.6 A
Iz x correction factors (real conditions of use): 245.6 A

Sizing constraint: user-defined

Correction :

Temperature	: 1.00	(52-D1)
x Soil thermal resistivity	: 1.00	(A.52-16)
x Neutral loaded	: 1.00	(D.52-1)
x touching conductors	: 1.00	(52-E4)
x User	: 1.00	
/ Protection)	: 1.00	(§433.1)
	1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 22.4	1 x 70.0		Copper
Neutral	1 x 22.4	1 x 70.0		Copper
PE	1 x 16.0	1 x 35.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	1.9975	4.16

Thermal stress check:

Energy received by the phase conductor : 6250000 A²s
Permitted thermal stress : 100200100 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**4.2367**	**3.6691**	**2.3626**	**2.7931**	**1.7630**	**0.0226**
R (mΩ)	16.1231	54.4652	108.9305	98.7460	133.5179	123.3334	188.5151
X (mΩ)	13.7983	25.3983	50.7967	43.1583	50.7967	43.1583	38.3583
Z (mΩ)	21.2214	60.0960	120.1922	107.7655	142.8542	130.6666	192.3780

Load

I: 96.45 A
P: 56.80 kW
Power factor 0.85
Number of identical circuits: 1
Polarity of circuit: 3P+N
Earthing arrangement: TT
Phase distribution: -
Ku: 1.0

Circuit : EMCC-3 (Q104-C104-L104) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q104

Name: NG125N-25.0 kA
Frame rating (In): 125 A
Trip unit rating: 80.00 A
Trip unit: C
Number of poles: 4P3d
Discrimination limit: T
BC reinforced by cascading:
Earth leakage protection: No
Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 80.0 A
Magnetic: Im(Isd) = -

Cable : C104

Length: 135.0 m
Installation method: E-circuits touching
Multi-core cables on perforated horizontal shelves
Cable type: Multi-core
Number of layers: 1
Insulation: XLPE
Nb additional touching circuits: 0
Arrangement of conductors: Touching, flat
Ambient temperature: 30 °C
THDI level: 0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 157.9 A
Iz x correction factors (real conditions of use): 157.9 A

Sizing constraint: user-defined
Correction :

Temperature	: 1.00	(52-D1)
x Soil thermal resistivity	: 1.00	(A.52-16)
x Neutral loaded	: 1.00	(D.52-1)
x touching conductors	: 1.00	(52-E4)
x User	: 1.00	
/ Protection)	: 1.00	(§433.1)
	1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 10.3	1 x 35.0		Copper
Neutral	1 x 10.3	1 x 35.0		Copper
PE	1 x 10.0	1 x 16.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	1.5785	3.74

Thermal stress check:
Energy received by the phase conductor : 2560000 A²s
Permitted thermal stress : 25050025 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**2.8007**	**2.4255**	**1.4976**	**1.7843**	**1.0863**	**0.0223**
R (mΩ)	16.1231	87.5188	175.0376	164.8531	218.1350	207.9506	332.5758
X (mΩ)	13.7983	24.5983	49.1967	41.5583	49.1967	41.5583	36.7583
Z (mΩ)	21.2214	90.9099	181.8199	170.0107	223.6139	212.0626	334.6010

Load

I: 43.73 A
P: 25.75 kW
Power factor 0.85
Number of identical circuits: 1
Polarity of circuit: 3P+N
Earthing arrangement: TT
Phase distribution: -
Ku: 1.0

Circuit : EMCC-4 (Q105-C105-L105) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q105

Name: NG125N-25.0 kA
Frame rating (In): 125 A
Trip unit rating: 125.00 A
Trip unit: C
Number of poles: 4P3d
Discrimination limit: T
BC reinforced by cascading:
Earth leakage protection: No
Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 125.0 A
Magnetic: Im(Isd) = -

Cable : C105

Length: 108.0 m
Installation method: E-circuits touching
Multi-core cables on perforated horizontal shelves
Cable type: Multi-core
Number of layers: 1
Insulation: XLPE
Nb additional touching circuits: 0
Arrangement of conductors: Touching, flat
Ambient temperature: 30 °C
THDI level: 0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 198.2 A
Iz x correction factors (real conditions of use): 198.2 A

Sizing constraint: user-defined
Correction :

Temperature	: 1.00	(52-D1)
x Soil thermal resistivity	: 1.00	(A.52-16)
x Neutral loaded	: 1.00	(D.52-1)
x touching conductors	: 1.00	(52-E4)
x User	: 1.00	
/ Protection)	: 1.00	(§433.1)
	1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 22.4	1 x 50.0		Copper
Neutral	1 x 22.4	1 x 50.0		Copper
PE	1 x 16.0	1 x 25.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	1.5475	3.71

Thermal stress check:
Energy received by the phase conductor : 6250000 A²s
Permitted thermal stress : 51122500 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**4.2137**	**3.6491**	**2.3443**	**2.7547**	**1.7339**	**0.0226**
R (mΩ)	16.1231	56.1047	112.2094	102.0249	137.7149	127.5305	194.8106
X (mΩ)	13.7983	22.4383	44.8767	37.2383	44.8767	37.2383	32.4383
Z (mΩ)	21.2214	60.4253	120.8506	108.6083	144.8424	132.8560	197.4928

Load

I: 74.38 A
P: 43.80 kW
Power factor 0.85
Number of identical circuits: 1
Polarity of circuit: 3P+N
Earthing arrangement: TT
Phase distribution: -
Ku: 1.0

Circuit : ELEVATOR-2 (Q106-C106-L106) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q106

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C106

Length:	58.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	0.4384	2.60

Thermal stress check:
Energy received by the phase conductor : 58593 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**2.0393**	**1.7661**	**1.0672**	**1.2773**	**0.7642**	**0.0223**
R (mΩ)	16.1231	123.4811	246.9622	236.7777	310.1985	300.0140	316.1177
X (mΩ)	13.7983	18.4383	36.8767	29.2383	36.8767	29.2383	24.4383
Z (mΩ)	21.2214	124.8501	249.7003	238.5761	312.3828	301.4354	317.0609

Load

I:	8.49 A	Polarity of circuit:	3P+N
P:	5.00 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

Circuit : ELEVATOR-4 (Q107-C107-L107) - Calculated

Upstream : ESMDB-BUS
Downstream :
Voltage : 400

Circuit breaker: Q107

Name:	C60H-15.0 kA	Frame rating (In):	63 A
Trip unit rating:	40.00 A	Trip unit:	B
Number of poles:	4P3d		
Discrimination limit:	T		
BC reinforced by cascading:			
Earth leakage protection:	No		

Earth leakage protection device : -
Sensitivity : -
Delay : -

Settings:
Overload: Ir = 40.0 A
Magnetic: Im(Isd) = -

Cable : C107

Length:	116.0 m		
Installation method:	E-circuits touching Multi-core cables on perforated horizontal shelves		
Cable type:	Multi-core	Number of layers:	1
Insulation:	XLPE	Nb additional touching circuits:	0
Arrangement of conductors:	Touching, flat		
Ambient temperature:	30 °C	THDI level:	0 %

Permitted current by the cable (Iz):
Iz under normal conditions of use (A): 74.7 A
Iz x correction factors (real conditions of use): 74.7 A

Sizing constraint: user-defined

Correction :			
	Temperature	: 1.00	(52-D1)
	x Soil thermal resistivity	: 1.00	(A.52-16)
	x Neutral loaded	: 1.00	(D.52-1)
	x touching conductors	: 1.00	(52-E4)
	x User	: 1.00	
	/ Protection)	: 1.00	(§433.1)
		1.00	

CSA (mm²)	theoretical	used	reference	metal
Per phase	1 x 3.4	1 x 10.0		Copper
Neutral	1 x 3.4	1 x 10.0		Copper
PE	1 x 4.0	1 x 10.0		Copper

Voltage drop	upstream	circuit	downstream
ΔU (%)	2.16	0.8768	3.04

Thermal stress check:
Energy received by the phase conductor : 58593 A²s
Permitted thermal stress : 2044900 A²s

Calculation results:

	Isc upstr.	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	I fault
(kA)	**11.9979**	**1.0975**	**0.9505**	**0.5619**	**0.6799**	**0.3998**	**0.0218**
R (mΩ)	16.1231	230.8391	461.6782	451.4937	585.0350	574.8505	590.9542
X (mΩ)	13.7983	23.0783	46.1567	38.5183	46.1567	38.5183	33.7183
Z (mΩ)	21.2214	231.9899	463.9797	453.1338	586.8530	576.1395	591.9154

Load

I:	8.49 A	Polarity of circuit:	3P+N
P:	5.00 kW	Earthing arrangement:	TT
Power factor	0.85	Phase distribution:	-
		Ku:	1.0
Number of identical circuits:		1	

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