

Technical documentation and instruction manual

Lahmeyer - Compactstation[®]

Type NDV 400 / 401

Drawing-Nr.: 0152J 77.1



SGB Neumark
Ohmstr. 1
08496 Neumark

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1 Use and technical determinations

The substation **type NDV400/401** is used as network and customer substation and it is examined by internal light arc **IAC AB 20 kA, 1 s**. The substation meets the following technical rules:

DIN 31000/DIN VDE 1000	General guiding principles responsible to security of technical products
DIN VDE 0101	Heavy current gears with rated voltages over 1 kV
DIN VDE 0105-100	Operation of heavy current plants
EN 60071-1 (VDE 0111 part 1)	Insulation co-ordination - Part 1: Definitions, principles and rules
EN 60071-2 (VDE 0111 part 2)	Insulation co-ordination - Part 2: Application guide
EN 60445 (VDE 0197)	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and conductor terminations
CENELEC HD 603 S1/A3	Heavy current cables; part 603: Distribution cables of rated voltage U0/U 0,6/1 kV
CENELEC HD 620 S1/A3	Heavy current cables; part 620: Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV
DIN VDE 0278-628	Heavy current cables garnitures with rated voltages U up to 30 kV (Um up to 36 kV); part 628: testing process for high current cables garnitures with nominal voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV
EN 60529 (VDE 0470 part 1)	Degrees of protection provided by enclosures (IP code)
EN 60076-10 (VDE 0532 part 76-10)	Power-transformers; part 10: determination of sound levels
DIN VDE 0660 part 514	low voltage-switch device combinations; protection against electric shock; protection against direct accidental touch of dangerous active parts
EN 62271 part 202	High-voltage switchgear and controlgear - Part 202: High voltage/low voltage prefabricated substation
EN 61230 (VDE 0683 part 100)	Live working - Portable equipment for earthing or earthing and short-circuiting
EN 206 (replacement for DIN 1045)	Concrete
DIN 1045	Structure made of concrete, reinforced concrete and pressed concrete
DIN EN ISO 6988	Metalic and other anorganic covers – testing with sulphur dioxide under general liquid condensation
DIN 4102	Fire behaviour of building materials and building parts
DIN 16913	Plastic moulding powder, reinforced reaction resin moulding powder
BGV A3 (previous VBG 4)	Accident prevention regulation: electric installations and means of production
BGV A8 (previous VBG 125)	Accident prevention regulation: security and healthprotection indication on the working place

The regulations of the water regime law (WHG = „Wasserhaushaltsgesetz“) of the Federal Republic of Germany and the regulation concerning electromagnetic fields; 26. BimSchG (federal immission law) have to be respected.

Installation, initial operation and operation of the substation take place by socialized staff, educated in coping with MV switchgears, transformers, BV distribution, the particular VDE-stipulations and the accident prevention regulations (BGV A3).

2. Station housing

Temperature class = 15 K

The substation, **type NDV400/401** is, like all Lahmeyer-Compactstations®, a plant ready and unit verified installation. It contains a medium voltage, a transformer and a low voltage room.

After connecting the MV and LV cables the substation is ready for operation.

2.1 The case of the substation, type NDV400/401, is a sheet-curved construction.

The station consists of:

- the foundation with oil sump, oilproof welded, afterwards hot dip galvanized (zinc) and double layer powdered (zinc powder 70 µm, top layer 70 µm), with side parts formed like skids which are the termination toward the earth and to the housing.
- two arbors curved of sheet iron to receive the MV and LV equipment, connected with the foundation.
- simple movable roof (the fixing screws are at the upper part of the door frame of the MV and LV room and they are marked red)
- lockable plug diaphragm of the front side (access to the transformer).
- housing doors and cover diaphragms inclusive for the MV and LV room liftable in one unit.

2.2 Material and surface treatment

Material (underground):

Oil sump: sheet iron 4 mm, hot dip galvanizes (zinc) (>750g/m²) and double layer powder coating (zincpuder 70µm, top layer 70µm), to pick up the transformer

Skids made of sheet iron, 2 mm, hot dip galvanizes (zinc) (>225 g/m²) double powder coating 100 % without pores (zinc powder, top layer)

Optional :

floor sump made of waterproof reinforced concrete using the exposure calsses XC4;XF1;XA1 for exterior parts and XC1 for interior parts. The armour of the floor sump consists of ribbled reinforcing concrete B 500 according to DIN EN 10080 and it is completely welded. The minimal concrete covering is according to DIN 1048 part 1 bigger than the possible water penetration detph.

Material (overground):

sheet iron, 2 mm, strip galvanized (zinc) (> 225 g/m²)

Surface treatment:

With IT-based powder coating gear and 5-zones pretreatment layer thicknesses equal > 70 µm. The used powder varnishes are without heavy metals and non toxic.

Zinc and powder varnishes = highest corrosion protection.

Standard color: pebble grey (RAL 6003-S)

Remark:

The lodged powder coeating can be recoated with liquid varnish into another color by the user if he wants to. The former corrosion protection remains existing!

2.3 All connecting elements of the housing are rust-proof (rustless steel).

- 2.4** The doors to the MV and LV rooms are fixed with three hinges each.
They have swing arm closures made of metal, planed for the installation of profile cylinders with an angle of closing of 45° or 90°. The profile cylinders are protected by rain protection flaps. Similar swing arm closures are used for the plug diaphragms.
– The cylinders them self don't belong to the delivery volume. –
The door to the MV room has a fourfold locking.
All doors can be constructed optional on the left or on the right side.
This can be adjusted on-site. Opening angle 90° and 130°.
- 2.5 Kind of protection**
- | | |
|------------------|-------|
| MV and LV room | IP 54 |
| Transformer room | IP 43 |
- 2.6** The substation type type NDV400/401, can - completely equiped – be lifted and forwarded.
The station is liftable at the foundation tub.
(look survey technical documents, lift plan and forwarding plan, too)
- 2.7** All installed parts are electrically conductive interconnected. They will be grounded on a central grounding point at the LV room.
- 2.8** All parts under voltage are covered touch-proof.
- 2.9** In both, the MV and/or the LV room, a lamp can be installed which switches by door contact (optional).

3. MV switchgear

In relation to **DIN-Transformers 12/ 24 kV** , with
max. dimensions L X W X H = 1250 X 900 X 1650 mm,
in hermetic verion with isolated ports:

- high performance HV fuse field	for 2 cables	fabrication SGB	12/24 kV
- 8DJ20	2 K + 1TSS	fabrication Siemens	12/24 kV
- FBX	2 K + 1TSS	fabrication AREVA	12/24 kV
- MINEX-C	2 (3) K + 1TSS*	fabrication Driescher	12/24 kV
- G.I.S.E.L.A.	2 K + 1TSS*	fabrication Driescher	12/24 kV

- MV transducer room 24 kV for MV measures

Short terms:	K	-	„Kabelschalter“ = cable switch
	TSS	-	„Transformator-Schalter, mit Sicherungsfeld“ = transformer switch, with fuse field

Fitting side of the MV construction look Matrix 288483.2 (NDV400)
look Matrix 291481.0 (NDV401)

4. Transformer room

- 4.1 DIN - transformers in hermetic version with isolated terminals ≤ 630 kVA
DIN - transformers with porcelain distributions,
max. dimensions L x W x H = 1250 x 900 x 1650 mm
Special transformer until 800 kVA 24 kV
They are layed in the foundation sump and fixed there, unscrewed. The transformers will be fasten additionally with belts. The belts remain fixed on the transformer.
- 4.2 Fabricated and verified MV cable bridges of N2XS_Y 35qmm CU RM / 16qmm CU RM, 12 / 20kV, connect the transformer with MV swichtgear.
- 4.3 The LV port takes place dependent on power and very flexible, 3kV- isolated wires, type NSGAFÖU 185 mm².
- 4.4 **Installation or exchange of the transformer**

When installing or exchanging the transformer one has to be careful that the particular leavings towards the MV switchgear and LV distribution are **without voltage and grounded**.
The transformer gets lifted out of the substation when exchanging.

Respect the following steps:

- Unfasten the fixation srew of the roof in the upper door frame of the LV closet, push the roof approximately 100 mm towards the LV side and lift it.
- Plug protection panel, above the transformer room, screw off and remove.
- Open plug panel.
- Insert transformer, connect it.
Respect stipulations!
- Fix the upper plug protection.
- Lay the roof on, let it snap into the „fixation shoes“ and srew it at the LV room.
- Insert plug panel and close.

5. Low voltage distribution

5.1.1 Input bar

Automatic circuit breaker	1600 A	
On-load fuse switch disconnecter	1600 A	
LV HRC-fuse on-load switch bar according to DIN 43 623 with:		size 3
<ul style="list-style-type: none"> – reinforced Cu bars and contacts as well as high temperature resistant isolation material at the switch bar - generous dimensioned collection rails - use of Al-oxide-ceramic for the fuse body, linked with a new melt technic 		
for voltages	400 V	
current	910 A	

The bar can be equipped with maximal:

3 pieces	LV HRC fuse inserts according to DIN 43 620 and VDE 0636 part 22	
	working class	gTr
	nominal current	910 A
	or with Cu disconnecting knife-switch	1000 A

5.1.2 Output bar

LV HRC fuse bars	400/630 A	according to equipment	max. 13 pieces
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5.1.3	Current transformer reconnectable,	1000/600/300/5 A, in L2	1 piece
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5.1.4	Amperemeter bimetallic construction with slider (15 min)		1 piece
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5.1.5	Synchronous plug socket to synchronise, fuses		3 pieces
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5.1.6	Construction current lead-in within the right side wall of the LV room		2 pieces
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optional:

- 3 Amperemeter with transducer
- 1 volmeter with selector switch and fuse
- 1 Schuko-socket, fuse
- 1 lamp, fuse

5.1.7	Indication instrument, fuses and clamp bar are mounted in a instrument board above the LV distribution.	
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5.1.8	The N- and the PE-rail for total grounding of the station are located on the bottom area of the LV room.	
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5.1.9	The cable bracket is adjusted at the removable separated floor panel.	
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Fitting side of the LV equipment	look matrix 288483.2 (NDV400)
	look matrix 291481.0 (NDV401)

5.2 Construction with LV counter

A LV counter can be realised when waiving of four output bars, with exemplified current transformers and a counter locker size 1.

The NDV 401 is deliverable with a counter closet room backwards. The LV room is completely available

6. Grounding dear

The central grounding rail is located at the LV room. There the grounding strip or the ground rod is attached. Therefore, all housing parts and the foundation are connected to the main earth.

7. Transport, building-up and monatge

The NDV400/401 will be fabricated ready for connection and piece verified.

Basis for transport, building-up and montage are technical documents like measurements on a drawing, lifting plan, earth excavation and lading plan.

7.1 Building-up on site..

Measurement drawing no. 292291.5 ; 292292.2 ; 292293.0 ; 292295.4
with concrete sump : 0152D92

7.2 When determining the depth of excavation keep the subsequent terrain hight and the expecting surface water in mind.

excavation drawing no. 283788.4
with concrete sump : 0152D94

7.3 The construction pit needs to have a floor able to take load. Rough protuberances are compensated by a horizontal wood float finish sandbed. Among difficult floor conditions a base made of lean concrete or sills is recommandable.

7.4 The placement of the station at the building pit takes place by suitable lifting devices. The NDV400/401 can be lifted fully equipped. lifting drawing no. 283787.6 with concrete sump: 0152D93

7.5 To connect the cable follow these steps:

7.5.1 Remove MV-sideways

- front panel of foundation sump
- cover of cable connection rooms of the MV switchgear according to the instruction manual of the switch manufacturer
- the lowwer arbor (srewed sideways)
- anterior floor part

7.5.2 Remove LV-sideways:

- front panel of foundation sump
- the lower arbor (srewed sideways)

8. Technical documents

	Steel sump	concrete sump
- Measurement drawing NDV400	292291.5	0152D92
- Measurement drawing NDV400	292292.2	
- Measurement drawing NDV401	292293.0	
- Measurement drawing NDV401	292295.4	
- Excavation	283788.4	0152D94
- Lifting plan	283787.6	0152D93
- Matrix NDV400	288483.2	
- Matrix NDV401	291481.0	
- Lading plan	0152U20	0152D95

Confirmation

according to §5 par.4 of the accident prevention regulation „Elektrische Anlagen und Betriebsmittel“ (BGV A3) (electrical installations and means of production)

FROM :

Sächsisch – Bayerische Starkstrom-Gerätebau GmbH

Ohmstraße 1

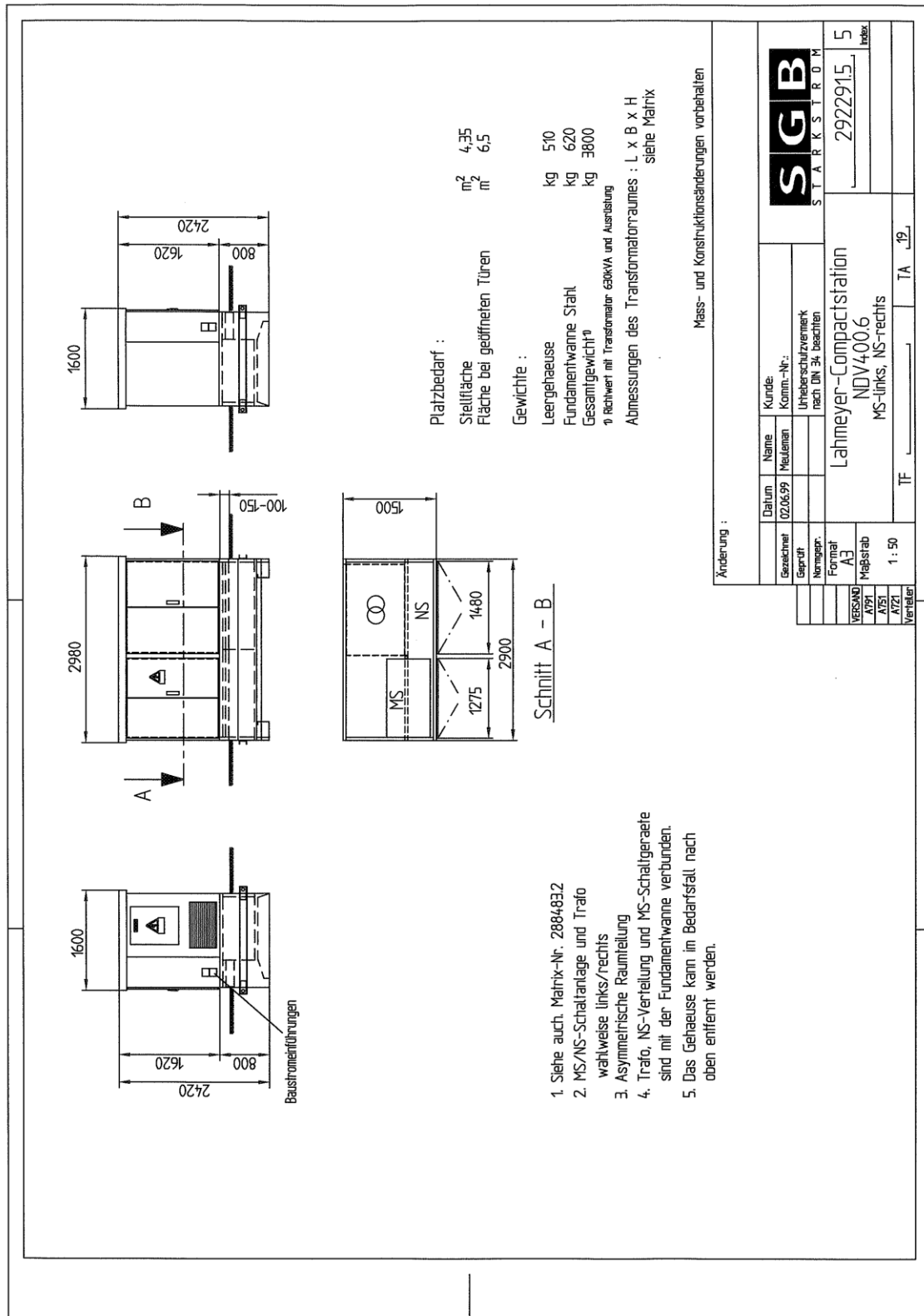
08496 NEUMARK

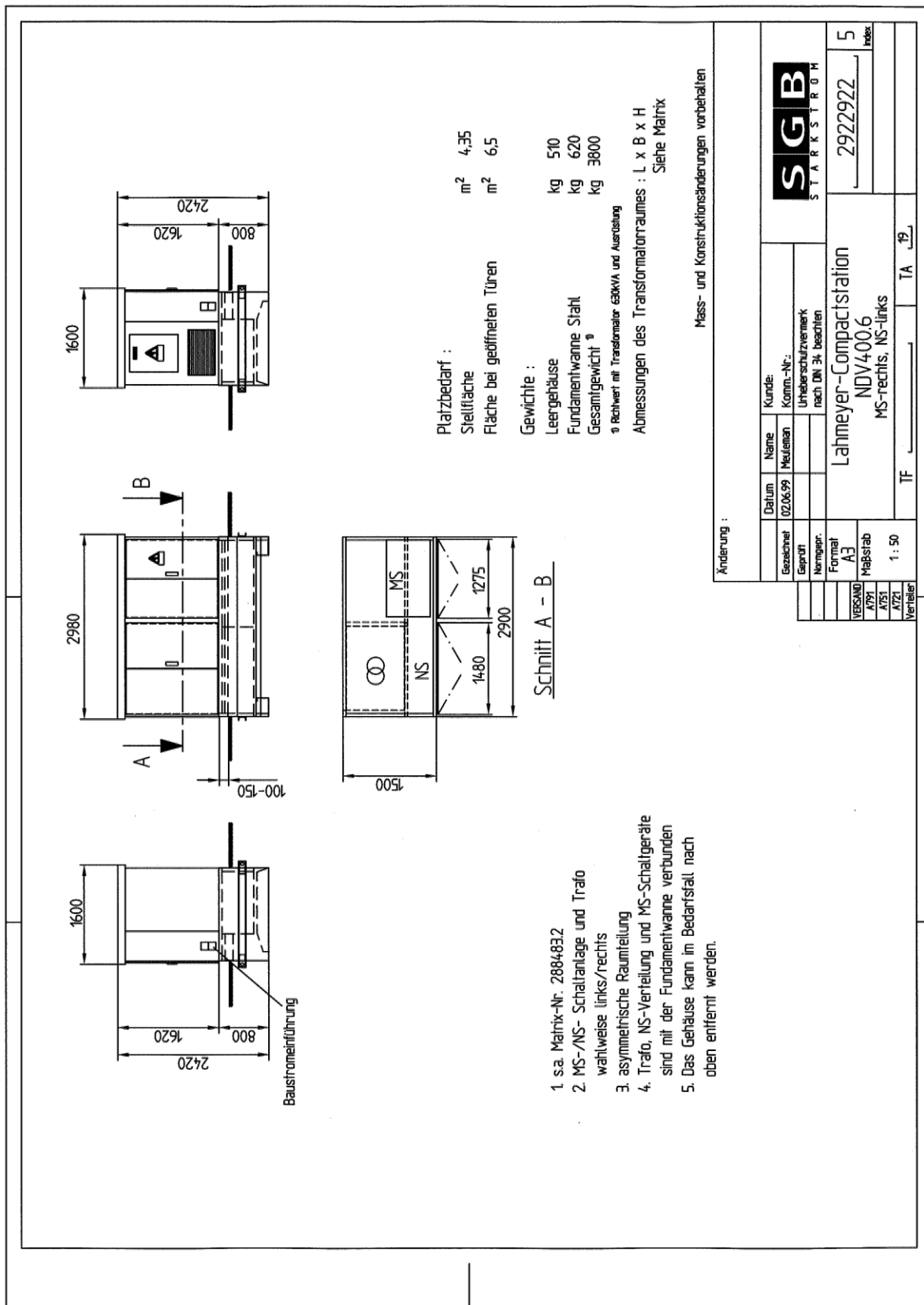
It is confirmed that the electrical installation / the electrical mean of production

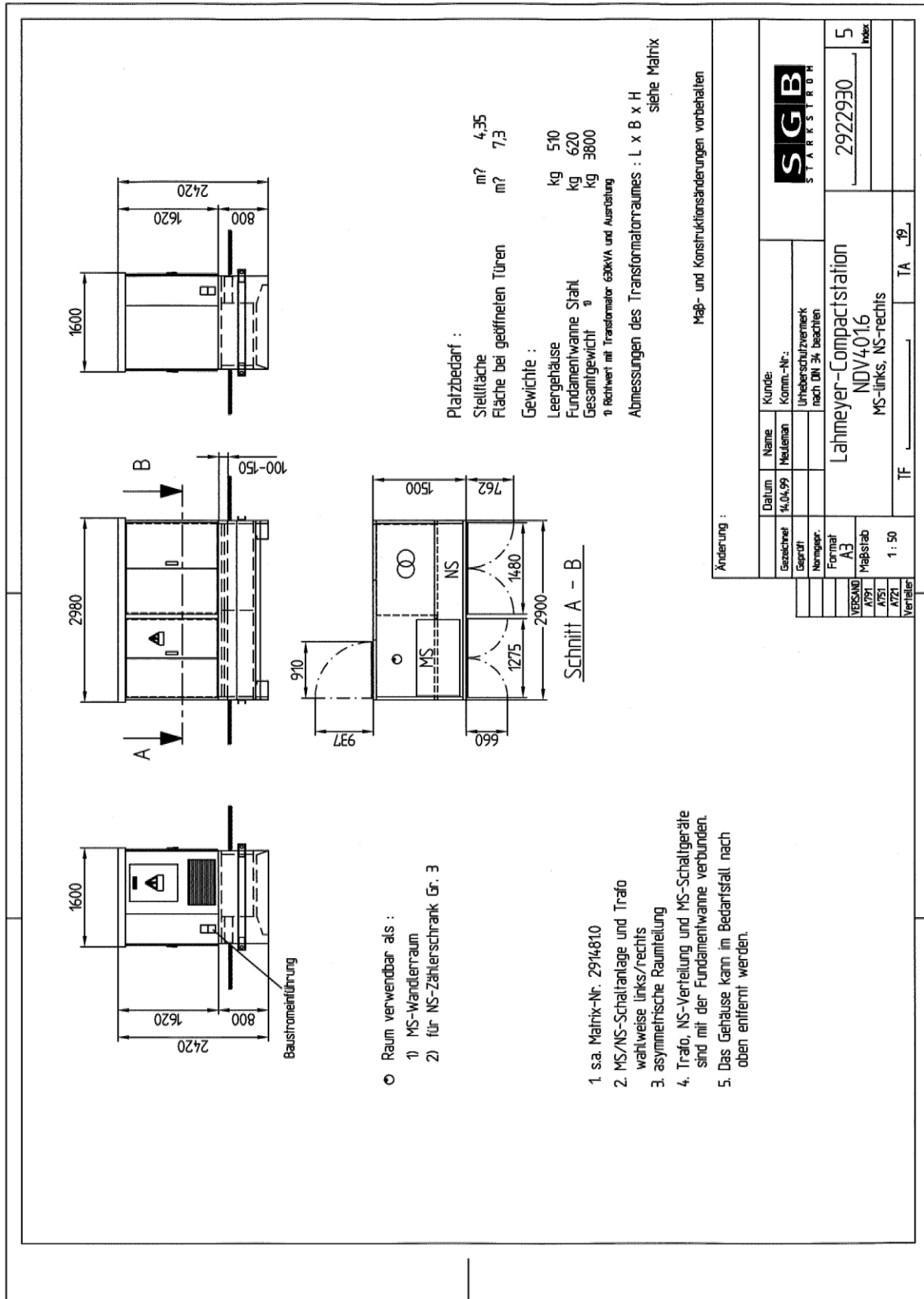
Compact Station type NDV400/401

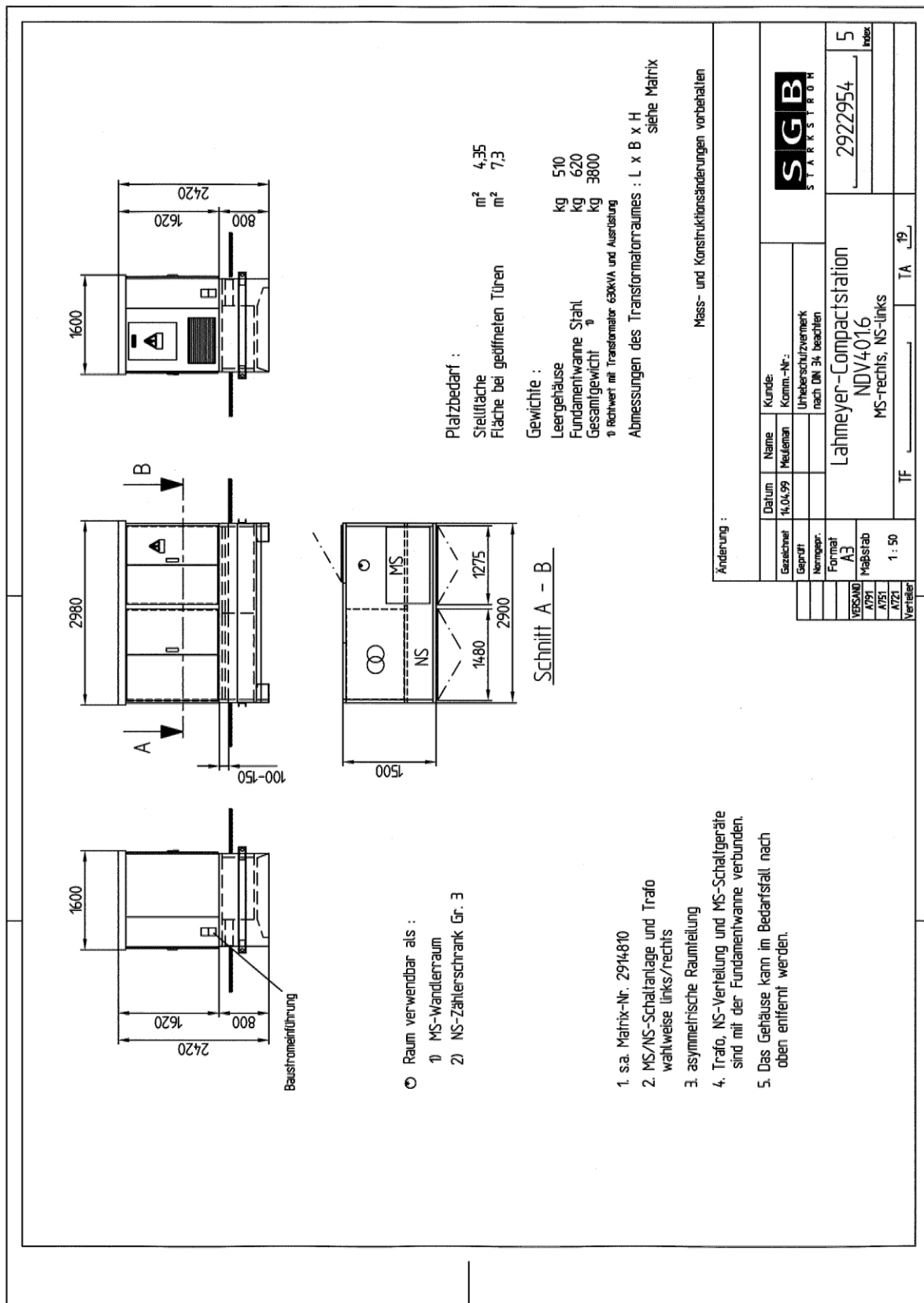
the determination of the accident prevention regulation „Elektrische Anlagen und Betriebsmittel“ BGV A3 (electrical installations and means of production) needs to be supplied.

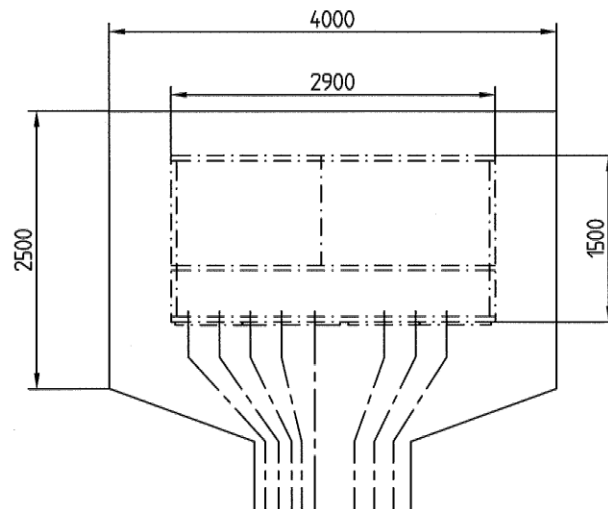
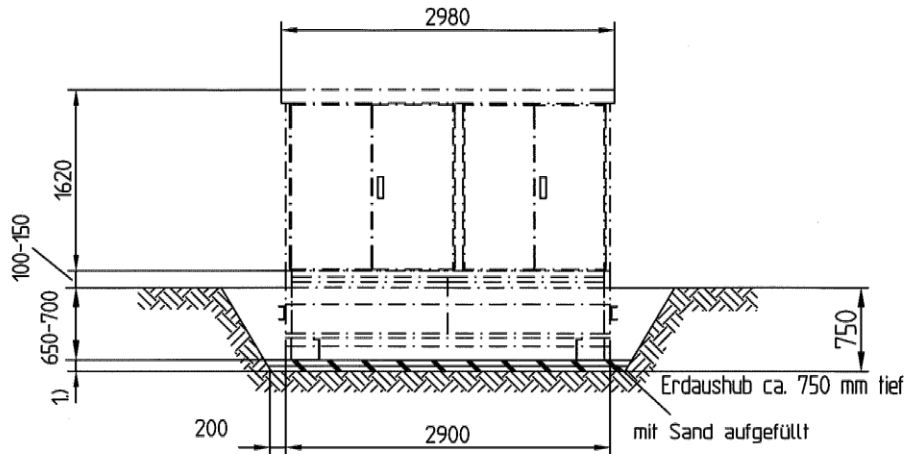
This confirmation serves only for the purpose that the entrepreneur is without engagement of verifying or letting verify the installation before the first entry into service (look §5 par.1 and 4 of the BGV A3). Civil warranty and liability claims are not settled by this confirmation.












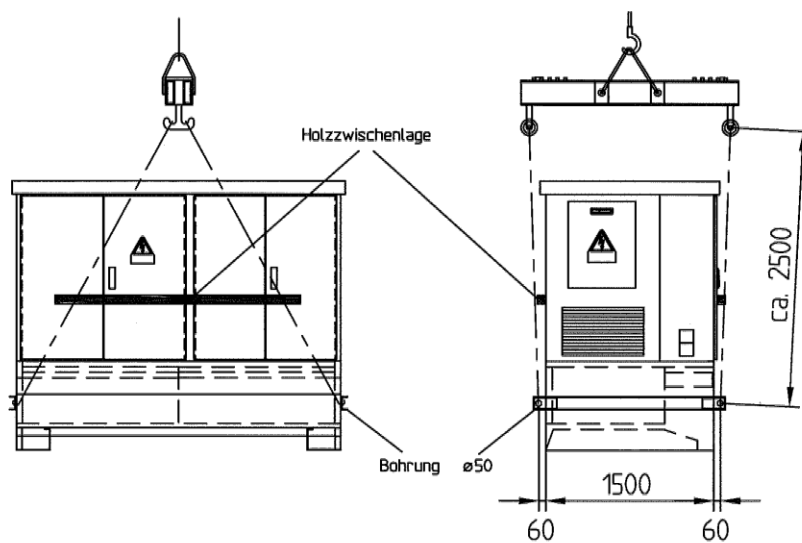
Maß- und Konstruktionsänderungen vorbehalten

Änderung :

	Datum	Name	Kunde:	
Gezeichnet	26.10.98	Meuleman	Komm.-Nr.:	
Geprüft				
Normgepr.			Urheberschutzvermerk nach DIN 34 beachten	
Format A4	Lahmeyer-Compactstation NDV400.6/NDV401.6 Bodenaushub			2837884
Maßstab 1 : 50				9 Index
TF		TA 19		

Gesamtgewicht 3800 kg

(Richtwert mit Transformator 630 kVA und
Ausrüstung)



Bänder oder Seile je nach
Schwerpunktlage einstellen!

Mass- und Konstruktionsänderungen vorbehalten

Änderung :


	Datum	Name	Kunde:		
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Geprüft					
Normgepr.			Urheberschutzvermerk nach DIN 34 beachten		
Format A4	Lahmeyer-Compactstation NDV400.6/NDV401.6 Hebeplan			2837876	7
Maßstab 1 : 50					Index
TF		TA		19	

Abbildung	Schaltanlage	Transformator	NS-Verteilung
①/②	8DJ20 3F 8DJ20 4F CTC (F/V) 3F CTC (F/V) 4F FBA 3F FBA 4F GA 3F GA 4F RGC 3F RGC 4F RM6 3F	1650 mm 1350 mm 1650 mm 1350 mm 1650 mm 1440 mm 1650 mm 1400 mm 1650 mm 1440 mm 1550 mm	1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm 1230 mm
③/④	8DJ20 3F CTC (F/V) 3F FBA 3F GA 3F RGC 3F RM6 3F	1650 mm 1650 mm 1650 mm 1650 mm 1650 mm 1550 mm	1430 mm 1430 mm 1430 mm 1430 mm 1430 mm 1430 mm

① Maßbild 283699.4

② Maßbild 286297.9

③ Maßbild 292292.2

④ Maßbild 292291.5

Länge des Transformators : siehe Tabelle I
Breite des Transformators : max. 900 mm
Höhe des Transformators : max. 1900 mm

Änderung :

Gezeichnet	Datum	Name	Kunde	S G B	STARKSTROM
09/02/99	09/02/99	Meulman	Meulman	2884832	4
Geprüft					
Nachgeprüft					
Format					
Maßstab					
1 : 50					

① Maßbild 290632.7

② Maßbild 290633.5

③ Maßbild 292295.4

④ Maßbild 292293.0

Abbildung	Schaltanlage	Transformator	NS-Verteilung
①/②	8DJ20 3F	1650 mm	1230 mm
	8DJ20 4F	1350 mm	1230 mm
	CTC (F/V) 3F	1650 mm	1230 mm
	CTC (F/V) 4F	1350 mm	1230 mm
③/④	FBA 3F	1650 mm	1230 mm
	FBA 4F	1440 mm	1230 mm
	GA 3F	1650 mm	1230 mm
	GA 4F	1400 mm	1230 mm
	RG6 3F	1650 mm	1230 mm
	RG6 4F	1440 mm	1230 mm
	RM6 3F	1550 mm	1230 mm
	8DJ20 3F	1650 mm	1430 mm
	CTC (F/V) 3F	1650 mm	1430 mm
	FBA 3F	1650 mm	1430 mm
	GA 3F	1650 mm	1430 mm
RG6 3F	1650 mm	1430 mm	
RM6 3F	1550 mm	1430 mm	

Länge des Transformators : siehe Tabelle I
 Breite des Transformators : max. 900 mm
 Höhe des Transformators : max. 1900 mm

① Raum verwendbar als :

- 1) MS-Wandleraum
- 2) für NS-Zählerschrank Gr. 3

Änderung :

Gezeichnet	Datum	Name	Kunde
Geprüft	17.05.99	Meulen	Komm.-Nr.:
Notizen:			Uberschützvermerk nach DIN 34 beachten
Format	A3		
Maßstab	1 : 50		

S G B
S T A R K S T R O M

Lahmeyer - Compactstation
 NDV4016
 Einbaumatrix

2914810

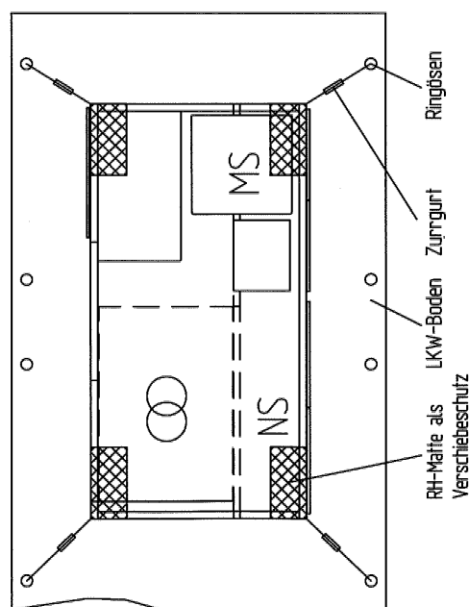
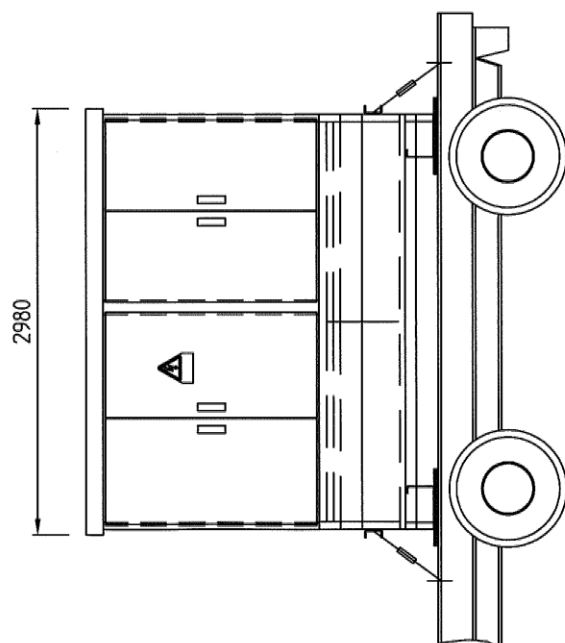
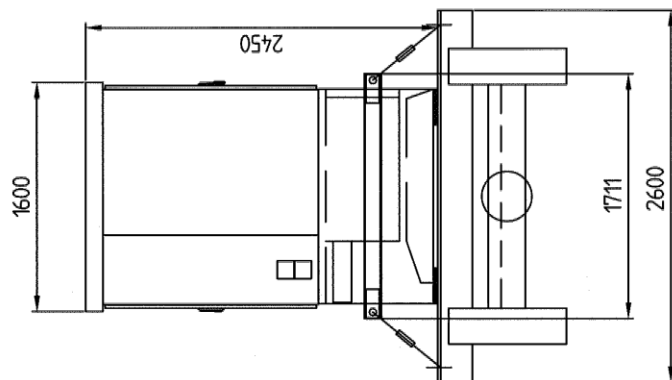
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Index

TF

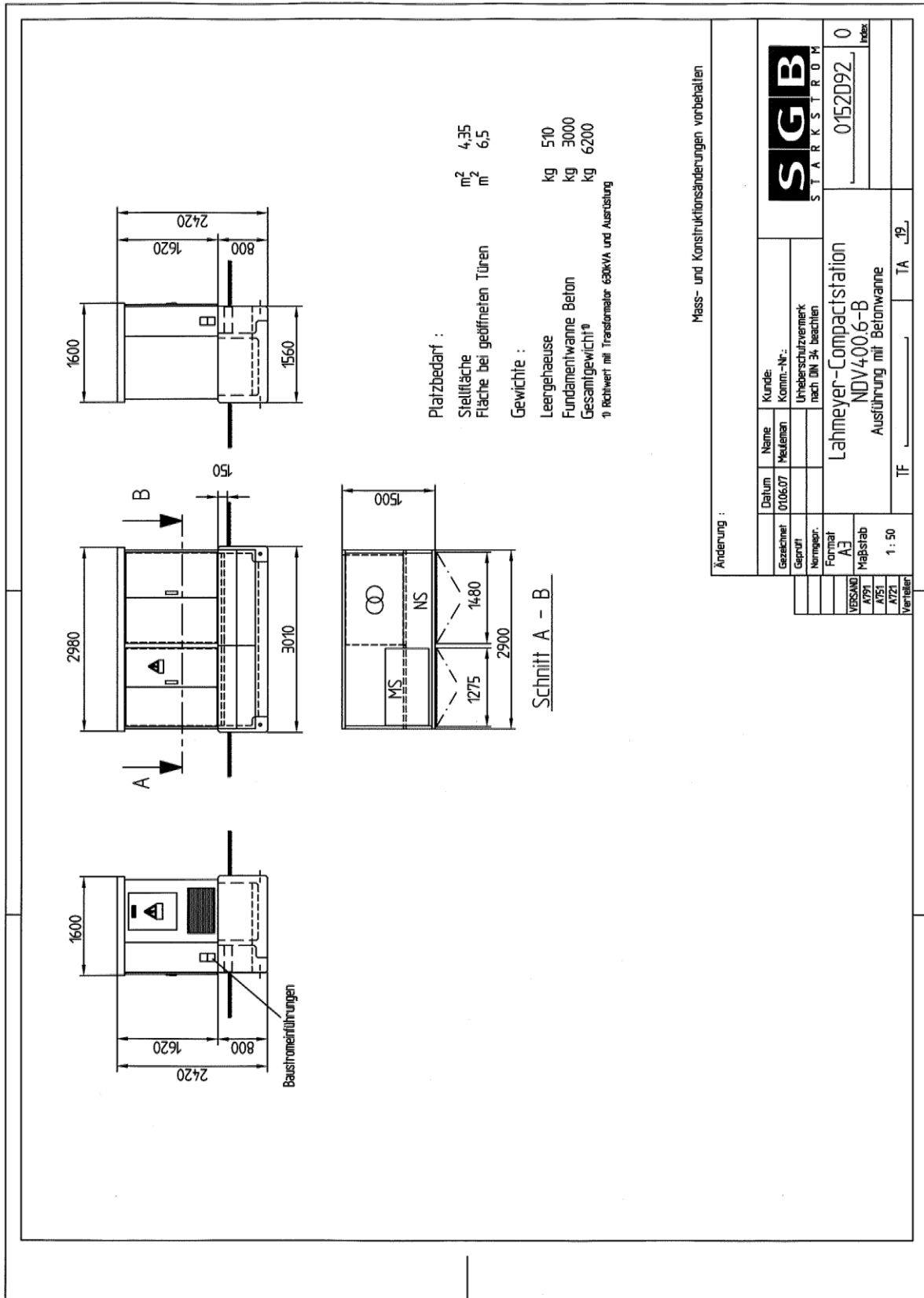
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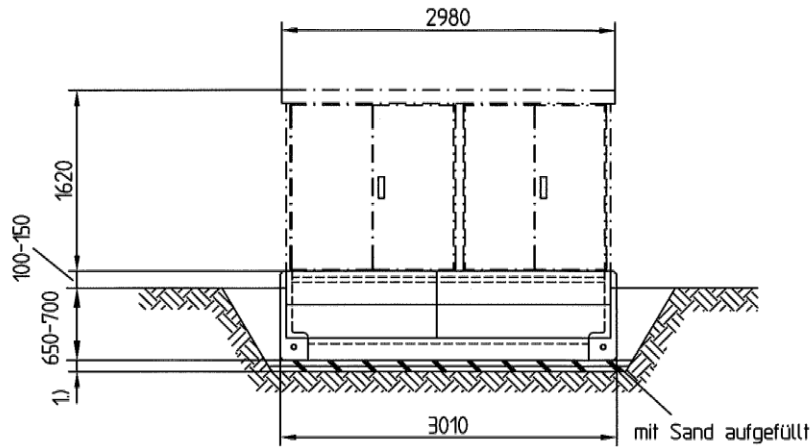
19



Verladung entsprechend VDI-Richtlinie 2700 bis 2702

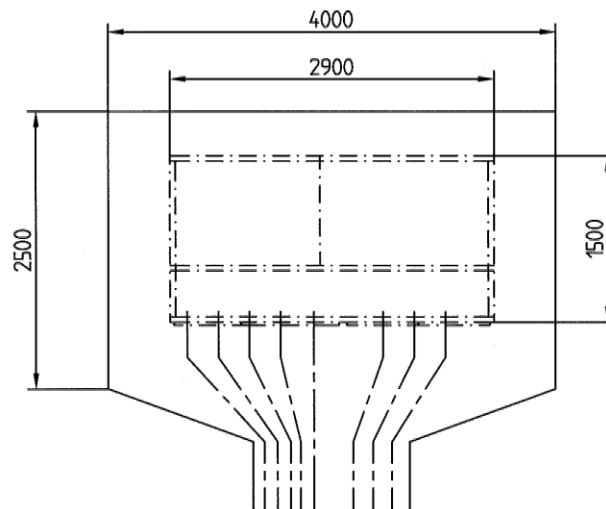
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1) Dicke der Bodenplatte ca. 200 mm
oder
befestigtes, waagrecht abgezogenes Sandbett
je nach Bodenbeschaffenheit

Bodenpressung $\approx 90 \text{ kN/m}^2$



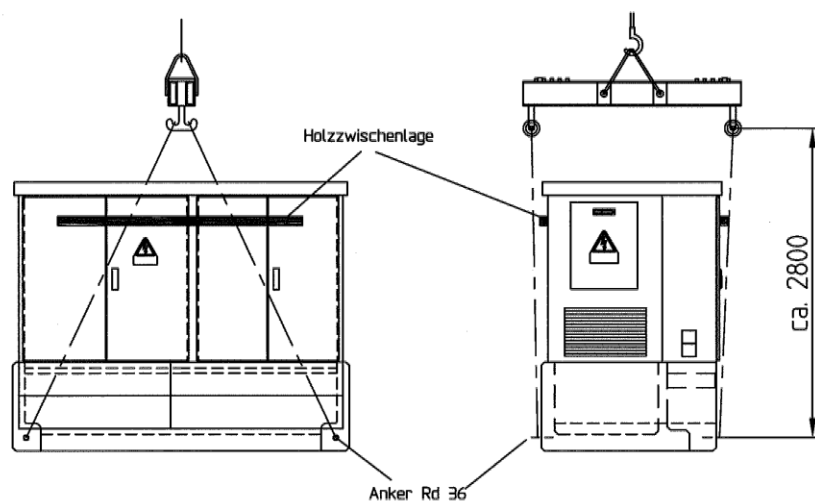
Mass- und Konstruktionsänderungen vorbehalten

Änderung :

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Normgepr.			Urheberschutzvermerk nach DIN 34 beachten		
Format A4	Lahmeyer-Compactstation NDV400.6/NDV401.6 - B Bodenaushub				0152D94
Maßstab 1 : 50					0 Index
TF		TA		19	

Gesamtgewicht 6500 kg


(Richtwert mit Transformator 630 kVA und
Ausrüstung)

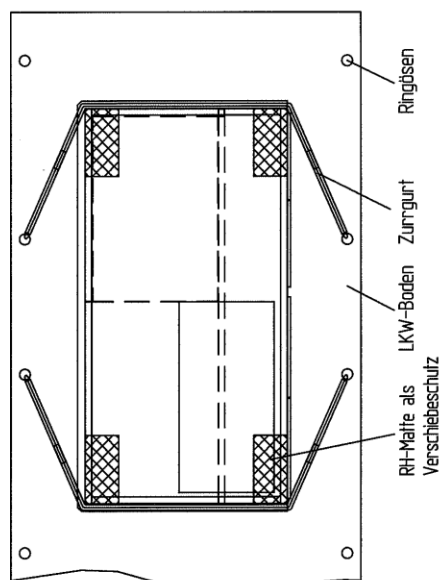
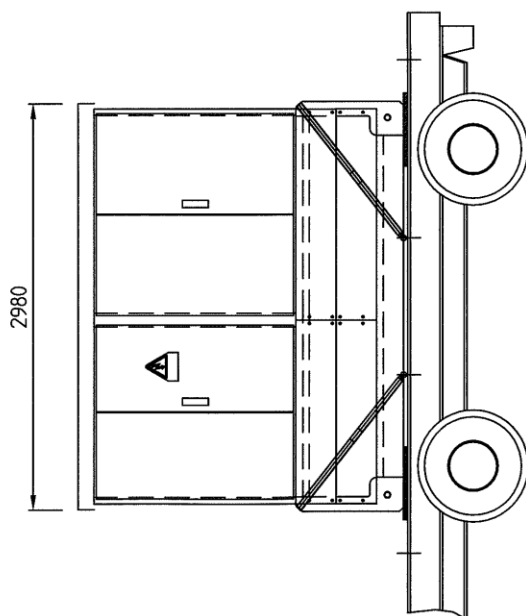
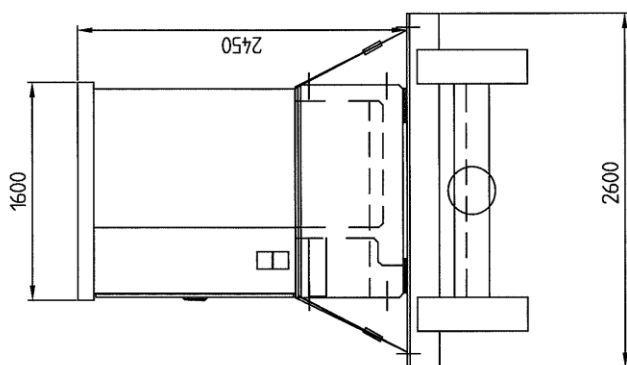


Bänder oder Seile je nach
Schwerpunktlage einstellen!

Mass- und Konstruktionsänderungen vorbehalten

Änderung :

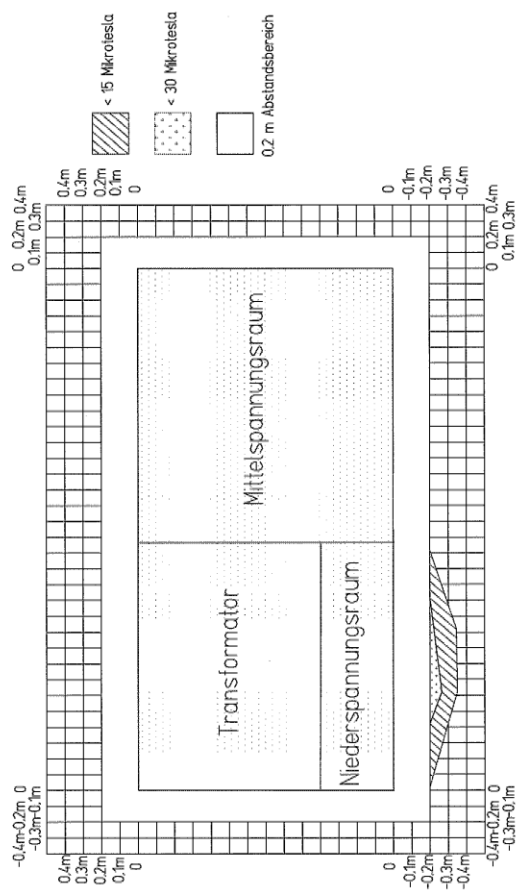
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Geprüft					
Normgepr.			Urheberschutzvermerk nach DIN 34 beachten		
Format A4	Lahmeyer-Compactstation NDV400.6/NDV401.6 - B Hebeplan			0152D93	0
Maßstab 1 : 50					Index
	TF		TA	19	




Verladung entsprechend VDI-Richtlinie 2700 bis 2702

[illegible]

<p>S G B S T A R K S T R O M</p>	<p>Messprotokoll Feldstärkenmessung</p>	<p>Seite 1 von 1</p>
<p>Compact-Station Typ: NDV400 Meßgerät: Combinova FD1 Meßbereich: 40 nT-100 μT/4 V/m-10 kV/m(RMS) Max. zulässige Grenzwerte: Magnetisches Feld B in Micro-Tesla : 100 μT Elektrisches Feld E in (kV/m) : 5kV / m</p>	<p>Einspeisung Uk-MS US in Kurzschluß DIN 630 kVA In = 910A Einspeisestrom MS: 34,6A</p>	
<p>Teilnehmer:</p>	<p>Zur Kenntnis :</p>	



Die Darstellung zeigt die über die gesamte Höhe der Station ungünstigsten Werten.
Die elektrische Feldstärke beträgt an der Blechoberfläche max. 40V/m.

		Prüfbericht		WF-Nr: 346268	
		Erwärmungsmessung		Seite: 1	
Art der Prüfung :		Typprüfung		Prüfvorschrift : IEC EN DIN 62271 Teil 202	
Hersteller :		SBG		Auftraggeber :	
Stationsdaten :		Auftr.-Num.:		Fabr.-Nr.: 346268	
Typ : NDV400		Nennleistung [kVA]: 630		Primärspannung [V]: 20000	
Frequenz [Hz]: 50		Isolationsklasse: A		Schaltgruppe: Dyn 5	
U _{k75} [%]: 4,0		Betriebsart: DB		Sekundärspannung [V]: 400	
		Masse [t]: 1,92		Primärstrom [A]: 18,19	
Belastungsart:		Kurzschluss		Spannungssteller Stufe: 2	
Belastung:		24 h mit 1,0x In bis Beharrung			
Temperaturen			Transformator ohne Station		
Transformator eingebaut in Station NDV400			Trafo Deckel		
Trafo Deckel 92,0 °C			Trafo Deckel 72,0 °C		
Umgebung 21,0 °C					
$\Delta T_1 = T_{\text{Öl}} - T_{\text{Umgeb}}$ 71,0 K			$\Delta T_2 = T_{\text{Öl}} - T_{\text{Umgeb}}$ 51,0 K		
<p>Die Temperaturdifferenz des Transformators beträgt 20 K. Die Station NDV400 erfüllt die Bedingungen für die Klasse 20: $\Delta t \leq 20$ K gemäß IEC EN DIN 62271 Teil 202.</p>					
<p>Prüfergebnis: Klasse 20: $\Delta t \leq 20$ K gemäß IEC EN DIN 62271 Teil 202</p>					
02.12.1997		Dipl.Ing.(FH) Gruner		SÄCHSISCH-BAYERISCHE	
Datum		Prüfer		STARKSTROM-GERÄTEBAU GMBH	
		Abnehmer		Ohmstraße 1 08496 Neumark	