

Rasējumu komplekta RAA darba rasējumu

Tēmas Nr. p.k.	Lapas	Tēmas nosaukums
RAA-1	1	Shēmu saraksts, Paskaidrojuma raksts
RAA-2	3	20 kV vienlīniju shēma
RAA-3	3	Ligzdas C sekundārās shēmas
RAA-4	1	Ligzdas F sekundārās shēmas
RAA-5	1	Ligzdas V(T) sekundārās shēmas
RAA-6	3	DVS blokshēma
RAA-7	2	Pašpatēriņa sadalne
RAA-8	2	Kontrolkabeļu saišu shēma
RAA-9	1	Kabeļu žurnāls
RAA-10	2	RAA iestatījumu aprēķins
RAA-11	5	Pielikums 1 "BVU strāvas sensoru montāža"
RAA-12	2	Pielikums 2_EK sistēmas_ SVS katalogs

Paskaidrojuma raksts.

RAA projektā ir paredzēts uzstādīt Siemens 8DJH slēgiekārtas transformatora apakšstacijās esošajā T75031 20 kV sprieguma pusē KS1-20 vietā uzstādīt CCCFF slēgiekārtu, kurai katru C moduļu ligzdu aprīkot ar 48V DC motorpiedziņu un to pieslēgt DVS un jaunbūvējamā KTA objekta Valmieras piens zemes gabalā uzstādīt 20kV komutācijas punktu ar 20kV slēgiekārtu CCV(T) T75031 tiks aprīkotas ar DVS vadību, kas ietver DVS (RTU) un ITT sadaļņu izbūvi. Lai pārraidītu jauno informāciju uz ST DVS tiks izmantots GPRS kanāls ar IEC 870-5-104 datu pārraides protokolu.

Telemehānika izveidota uz firmas “MARTEM” aparatūras bāzes. Vadāmo slodzes slēdžu vadība un signalizācija tiks izmantotas fiziskās ķēdes.

Projektā kā pašpatēriņa avots paredzēts transformators TNr.1.

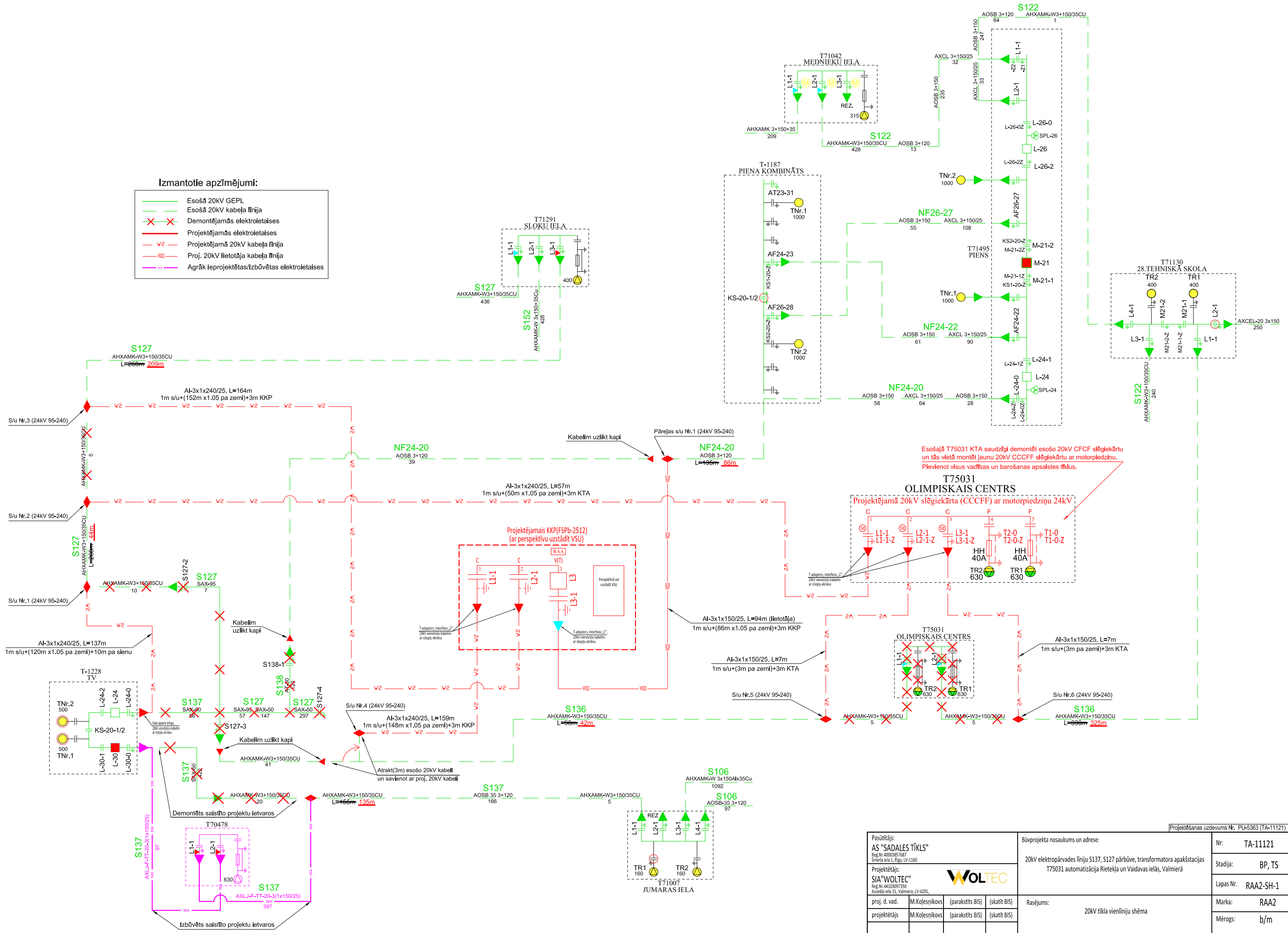
Lai objekts darbotos ir nepieciešama līdzsprieguma sadalne, kas baro visas iekārtas un bez sprieguma pauzē turpina barot no akumulatoriem. Līdzsprieguma sadalne paredzēta ar 48 VDC un 4 x 7.2 Ah akumulatoriem.

Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

<div>Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small></div>				<div>Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā</div>		Nr:	TA-11121
<div>Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small></div> <div></div>						Stadija:	BP, TS
						Lapas Nr.	RAA1-SH-1
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)	<div>Rasējums: Vispārējie norādījumi un apraksts</div>		Marka:	RAA1
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Mērogs:	b/m

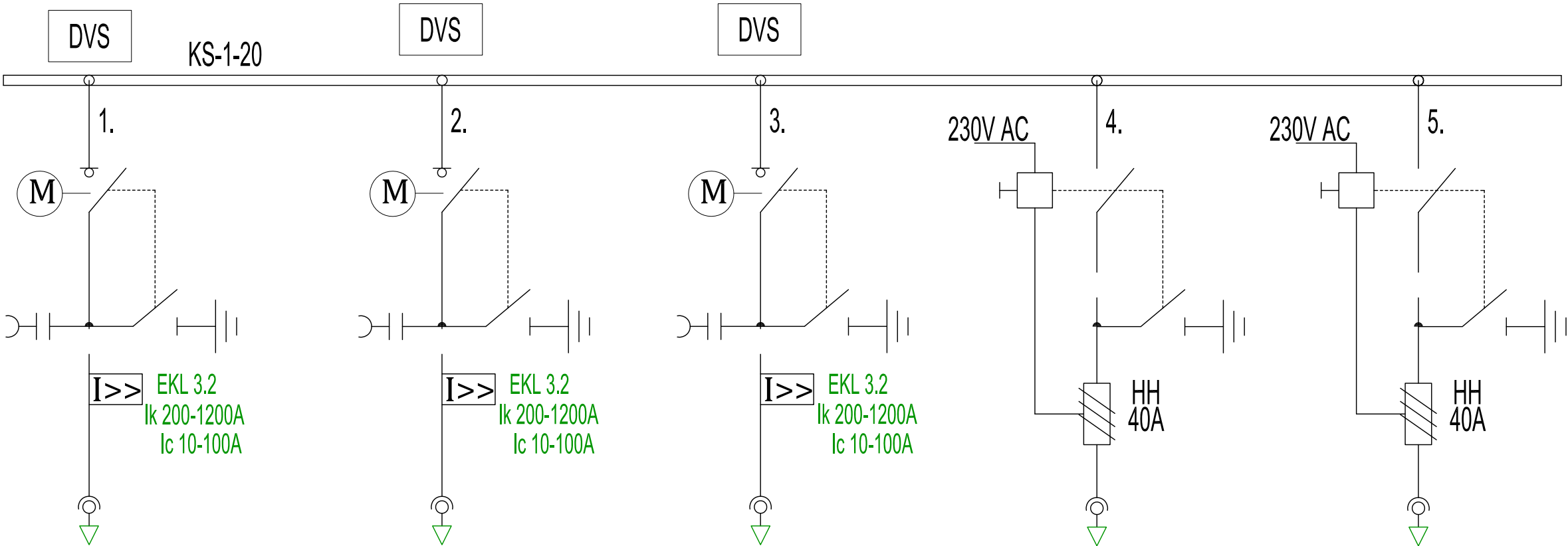
Izmantotie apzīmējumi:

- Esošā 20kV GEPL
- Esošā 20kV kabeļa līnija
- Demontējamās elektroietaisēs
- Projektējamās elektroietaisēs
- Projektējamā 20kV kabeļa līnija
- Proj. 20kV lietotāja kabeļa līnija
- Agrāk ieprojektētas/izbūvētas elektroietaisēs



Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160			Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr. TA-11121
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausēkļa iela 31, Valmierā, LV-4201			Rasējums: 20kV tīkla vienlīniju shēma		Stadija: BP, TS
proj. d. vad. M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA2-SH-1
projektētājs M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA2
					Mērogs: b/m

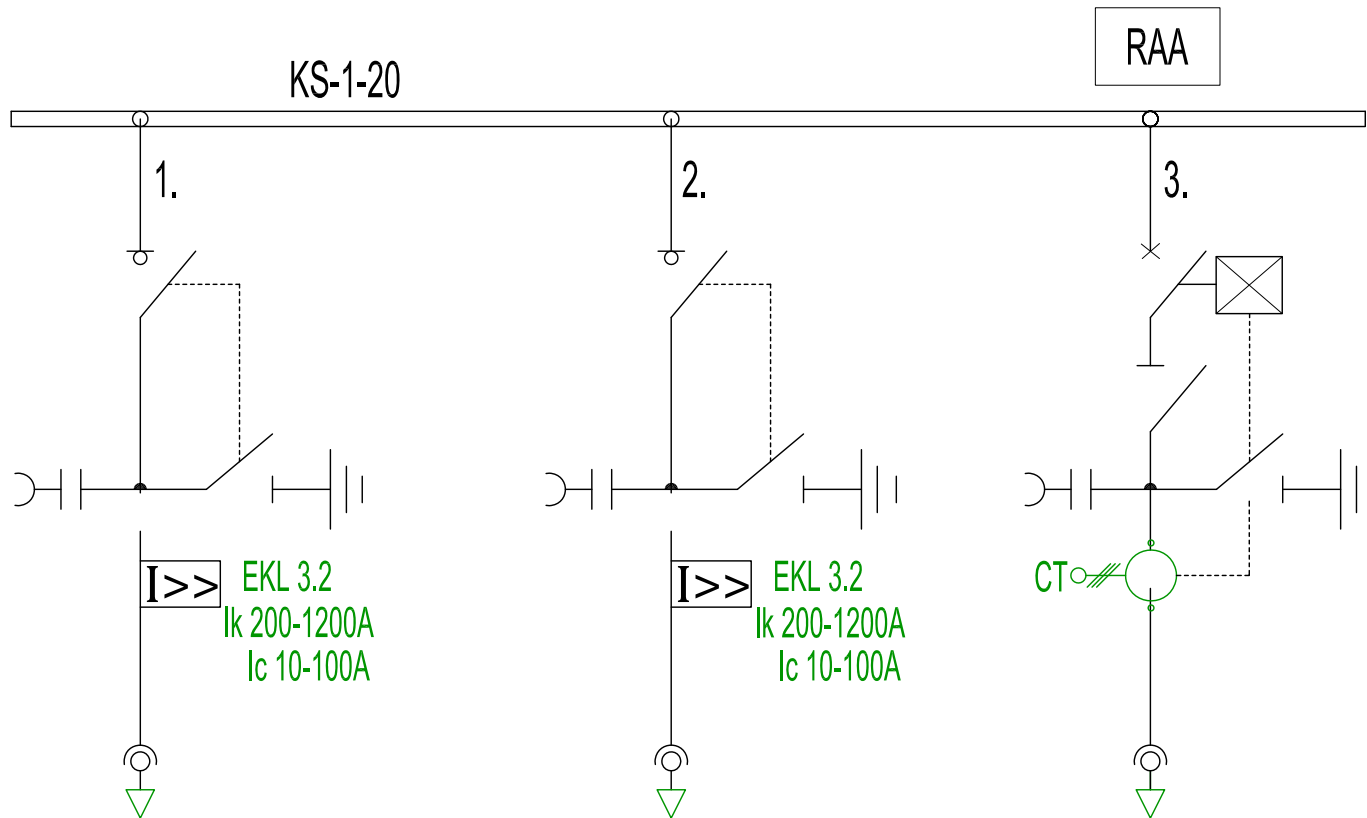
T75031



Panel	H1	H2	H3	H4	H5
Panel Name	C	C	C	F	F
Module	8DJH	8DJH	8DJH	8DJH	8DJH
Relay					
Motor Voltage	48V DC	48V DC	48V DC		
Coil Voltage	48V DC	48V DC	48V DC	230 V AC	230 V AC

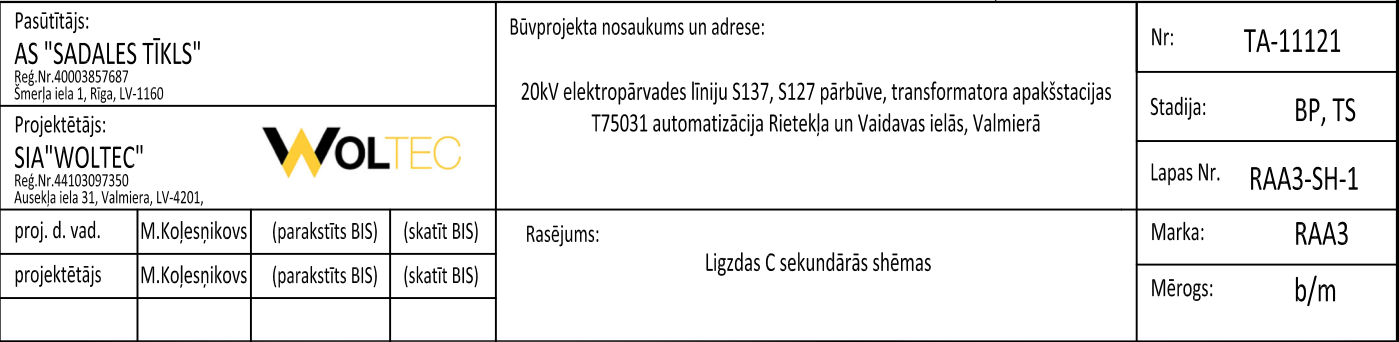
Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: 20kV tīkla vienlīniju shēma		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA2-SH-2
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA2
						Mērogs: b/m

Projektējamais ST KTA-1

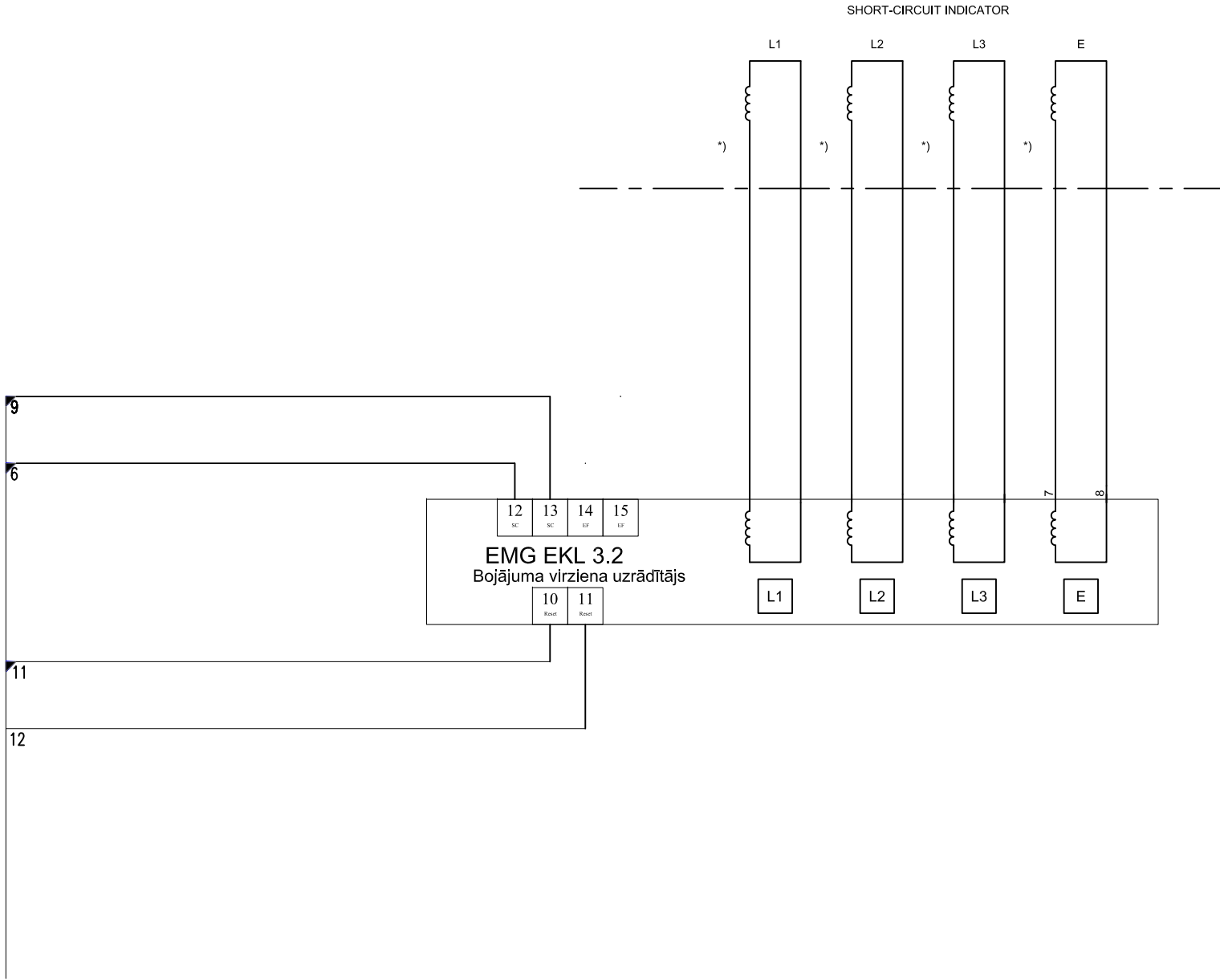


Panel	H1	H2	H3
Panel Name	C	c	V(T)
Module	8DJH	8DJH	8DJH
Relay			WIC1 SEG
Motor Voltage			
Coil Voltage			230 V AC

Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr. 40003857687 Smerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" Reģ.Nr. 44103097350 Ausekļa iela 31, Valmiera, LV-4201,				Rasējums: 20kV tīkla vienlīniju shēma		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA2-SH-3
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA2
						Mērogs: b/m

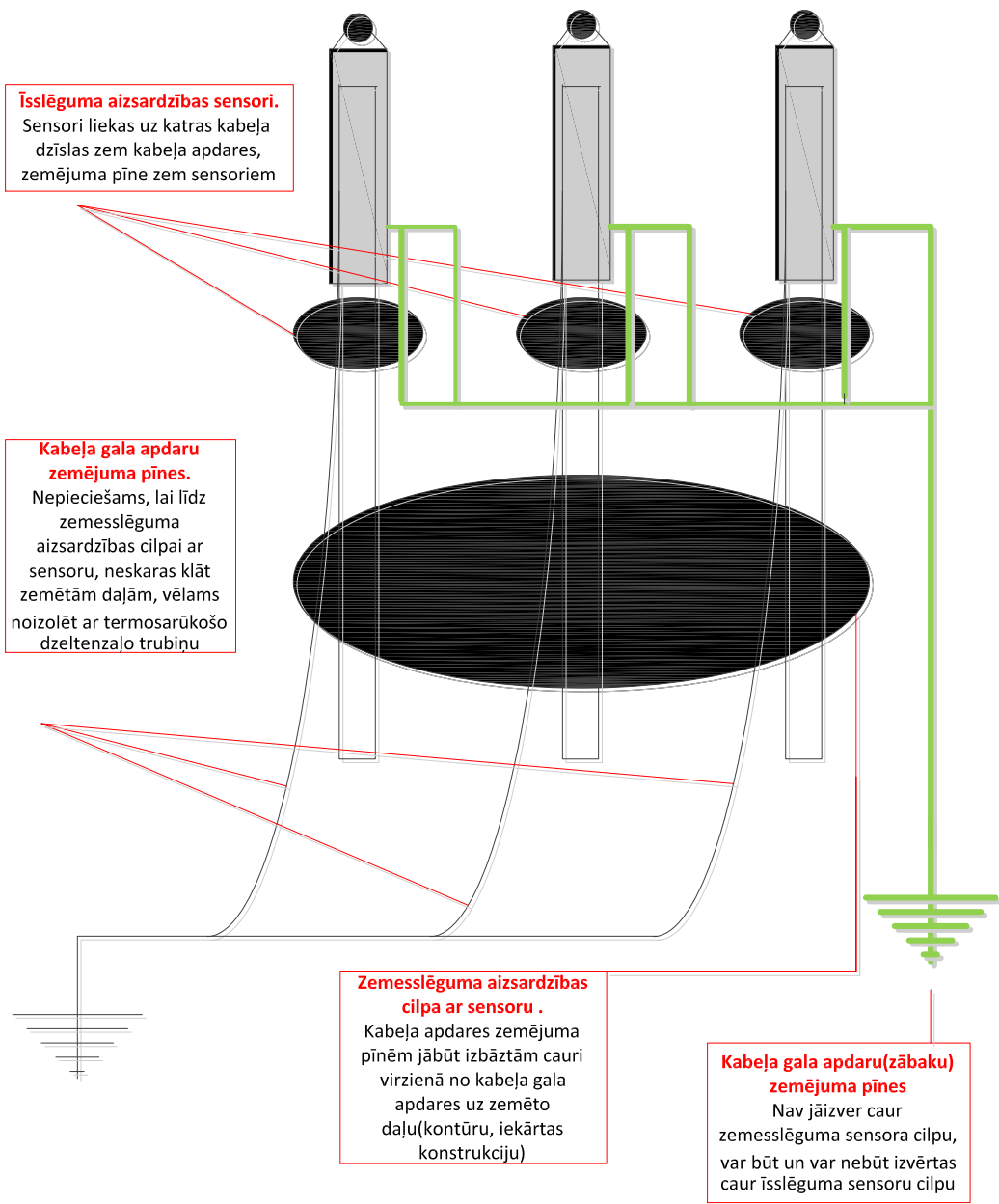


M H1 (2;3) 12x1 mm2

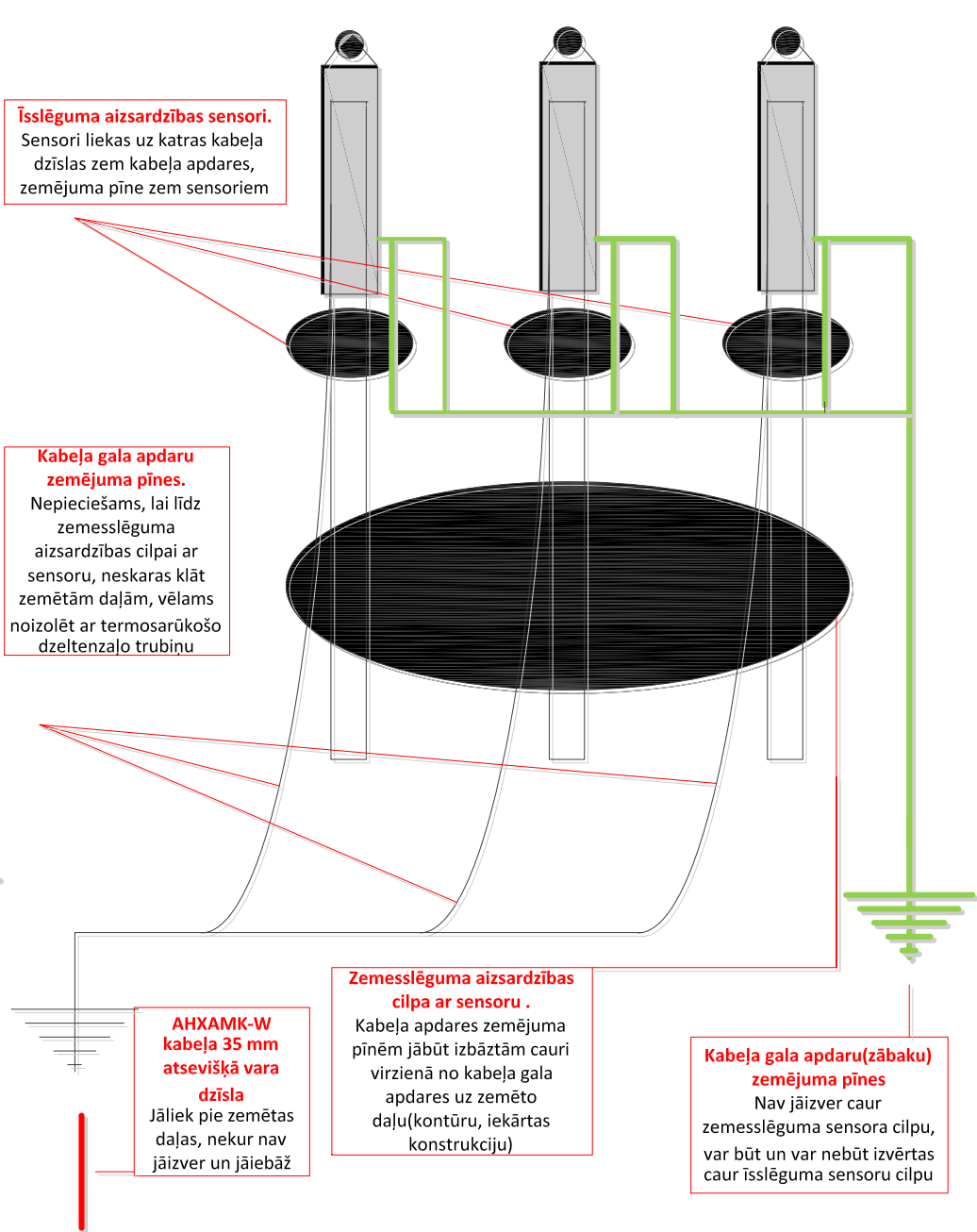


Projektēšanas uzdevums Nr. PU-5363 (TA-11121)			
Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160		Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā	
Projekētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,		Nr: TA-11121	
proj. d. vad. M.Kolesņikovs (parakstīts BIS) (skatīt BIS)		Stadija: BP, TS	
projektētājs M.Kolesņikovs (parakstīts BIS) (skatīt BIS)		Lapas Nr. RAA3-SH-2	
		Rasējums: Ligzdas C sekundārās shēmas	
		Marka: RAA3	
		Mērogs: b/m	

Kabelis ar stieplu ekrānu



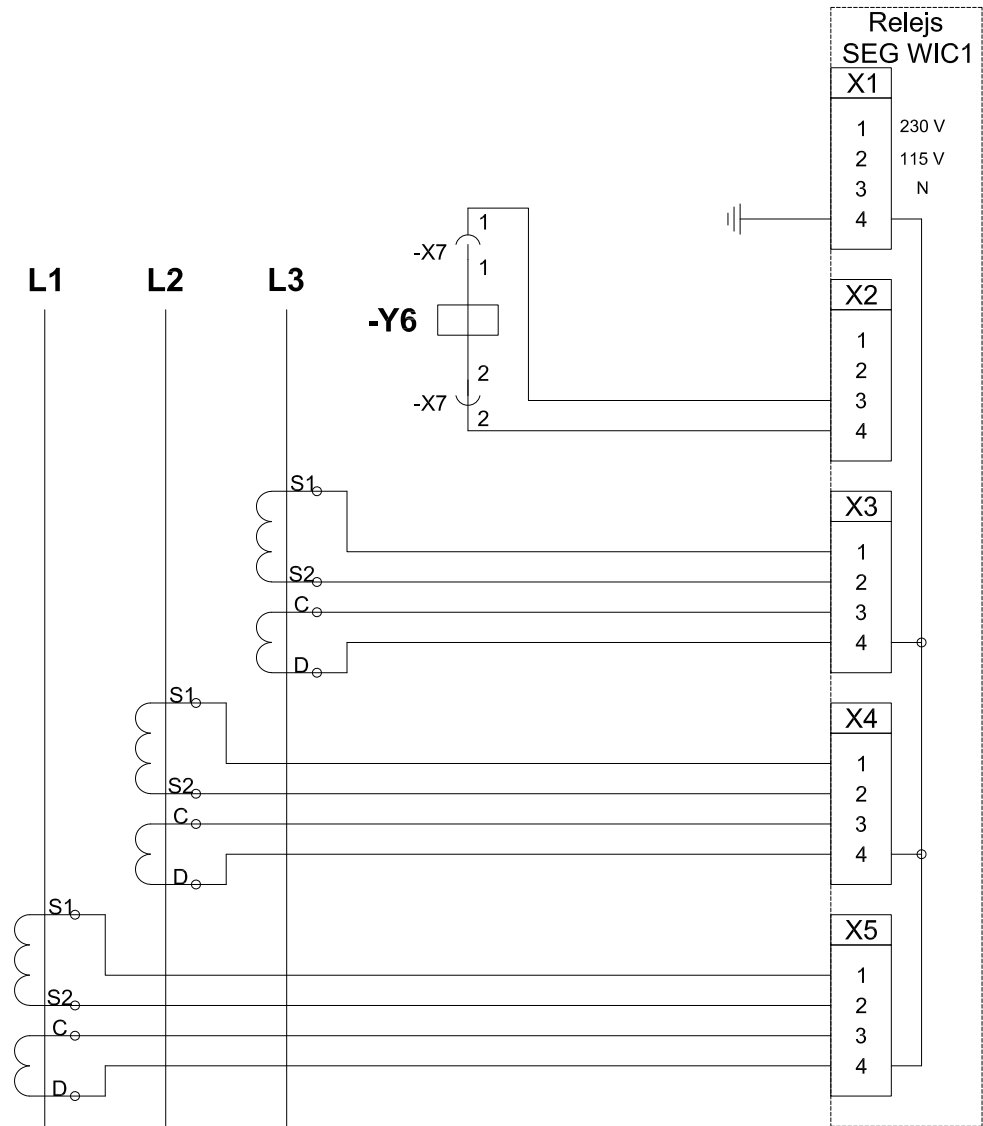
Kabelis ar folijas ekrānu un vara atsevišķu dzīslu



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmierā, LV-4201,				Rasējums: Līdzdas C sekundārās shēmas		Stadija: BP, TS
proj. d. vad.	M.Koļesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA3-SH-3
projektētājs	M.Koļesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA3
						Mērogs: b/m

Ligzda L3



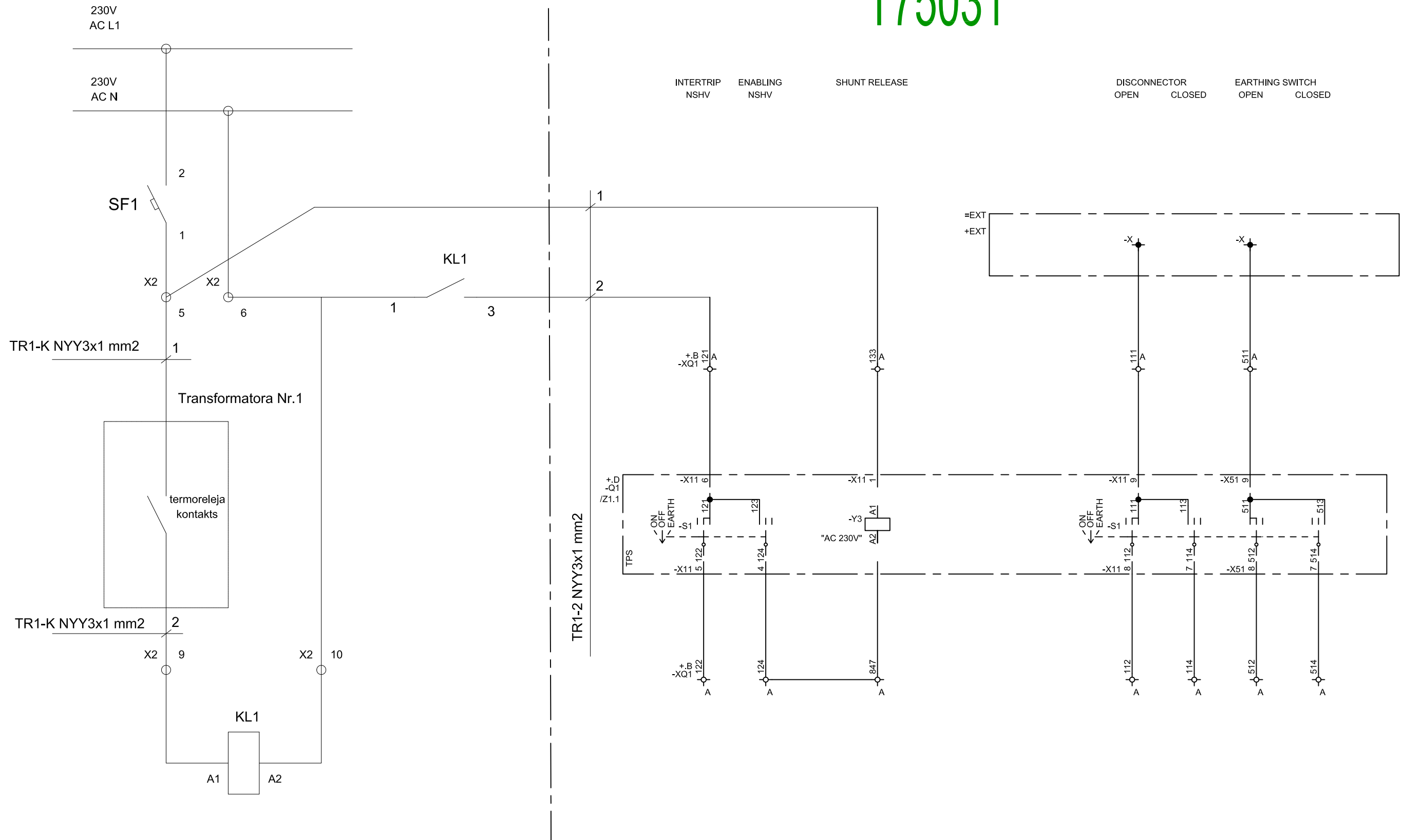
Paredzēts uzstādīt strāvmaiņus WIC W3 ar strāvu nominālo diapazonu 32-112A

Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: Ligzdas V(T) sekundārās shēmas		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA4-SH-1
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA4
						Mērogs: b/m

Ligzda H4

T75031

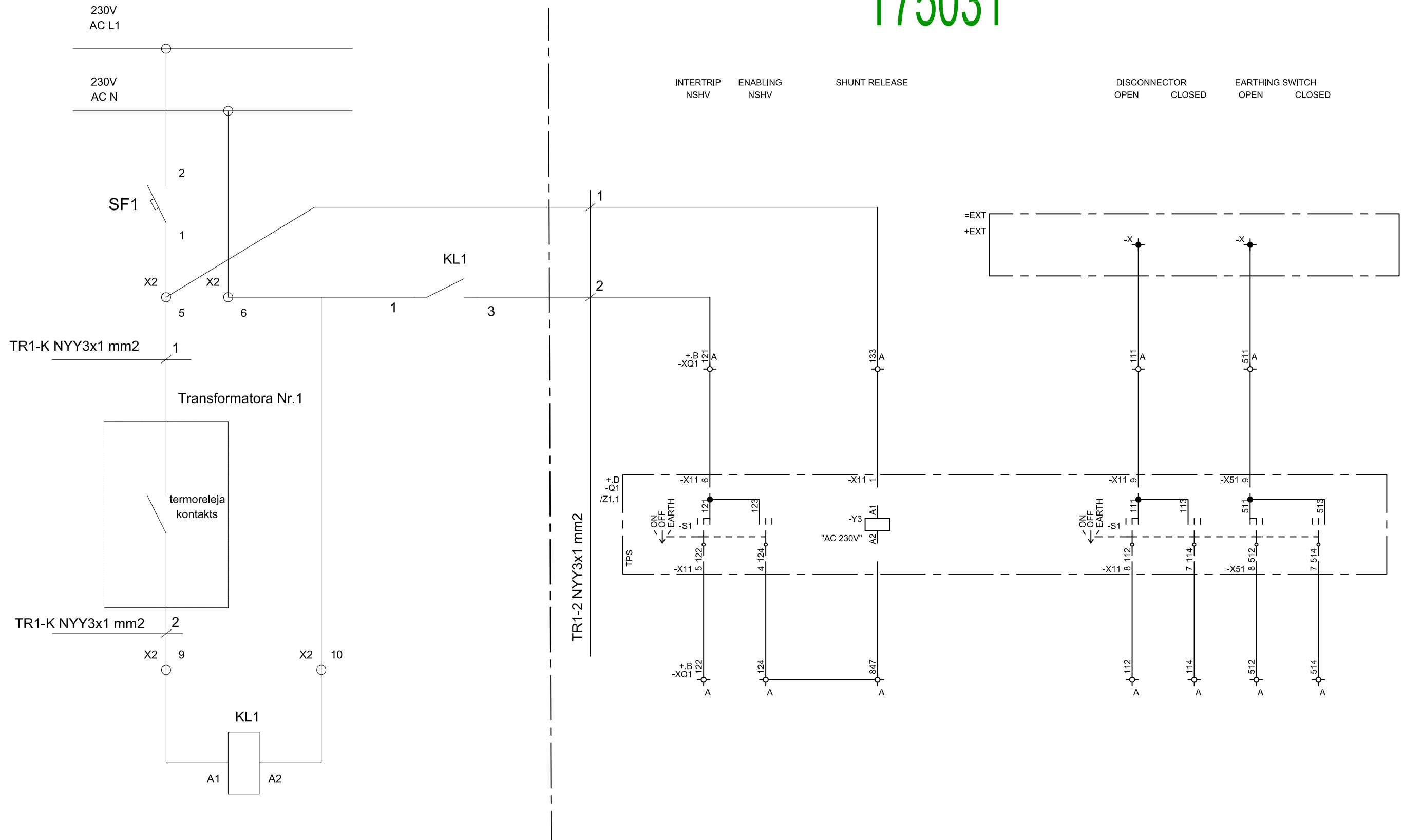


Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr.: TA-11121	
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201, 				Rasējums: Līdzdas F sekundārās shēma		Stadija: BP, TS	
proj. d. vad. M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Lapas Nr. RAA5-SH-2	
projektētājs M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Marka: RAA5	
						Mērogs: b/m	

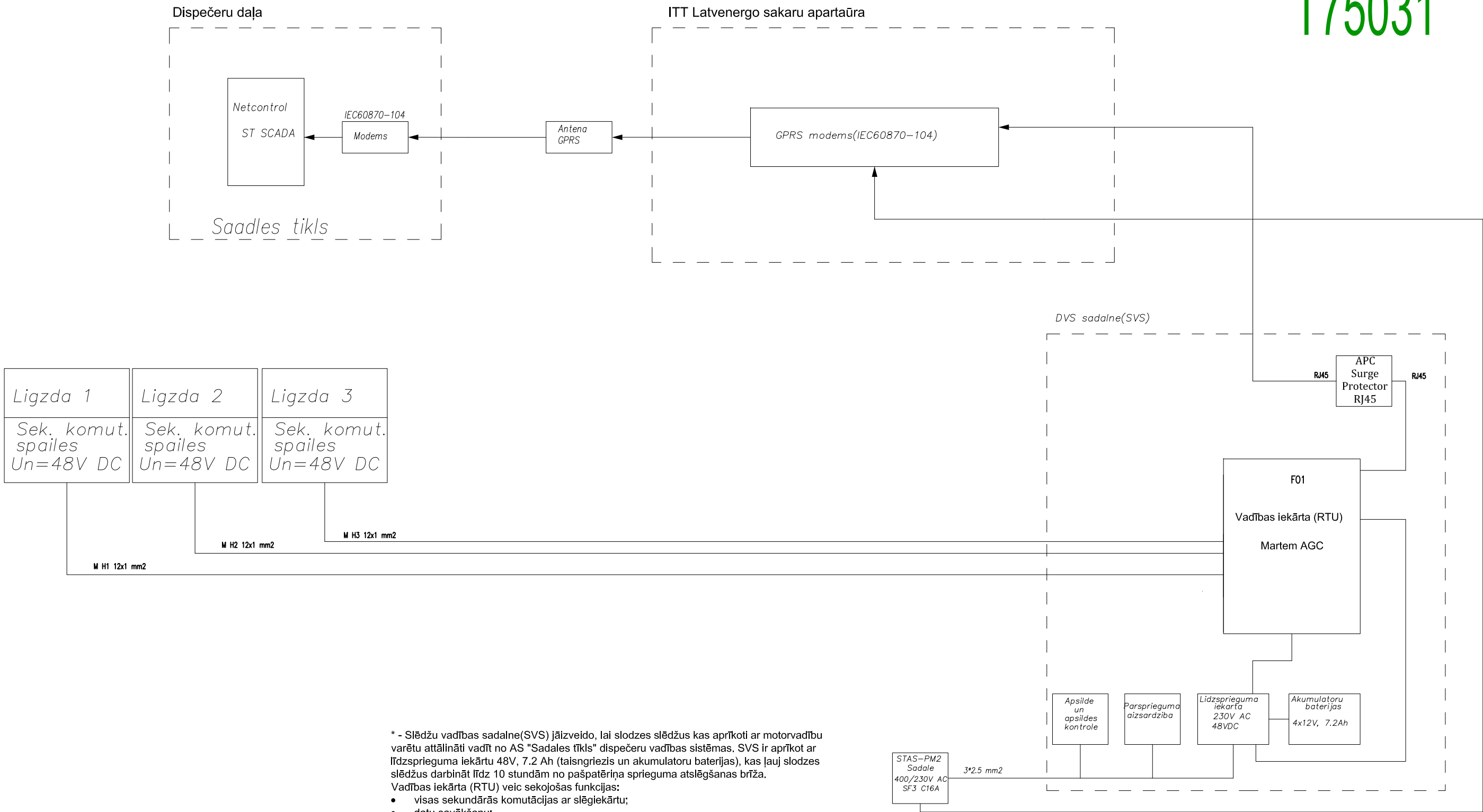
Ligzda H5

T75031



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

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Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201, 				Rasējums: Līdzdas F sekundārās shēma		Stadija: BP, TS	
proj. d. vad. M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Lapas Nr. RAA5-SH-2	
projektētājs M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Marka: RAA5	
						Mērogs: b/m	



* - Slēdžu vadības sadalne(SVS) jāizveido, lai slodzes slēdžus kas aprīkoti ar motorvadību varētu attālināti vadīt no AS "Sadales tīkls" dispečeru vadības sistēmas. SVS ir aprīkot ar līdzsprieguma iekārtu 48V, 7.2 Ah (taisngriezis un akumulatoru baterijas), kas ļauj slodzes slēdžus darbināt līdz 10 stundām no pašpatēriņa sprieguma atslēgšanas brīža.

Vadības iekārta (RTU) veic sekojošas funkcijas:

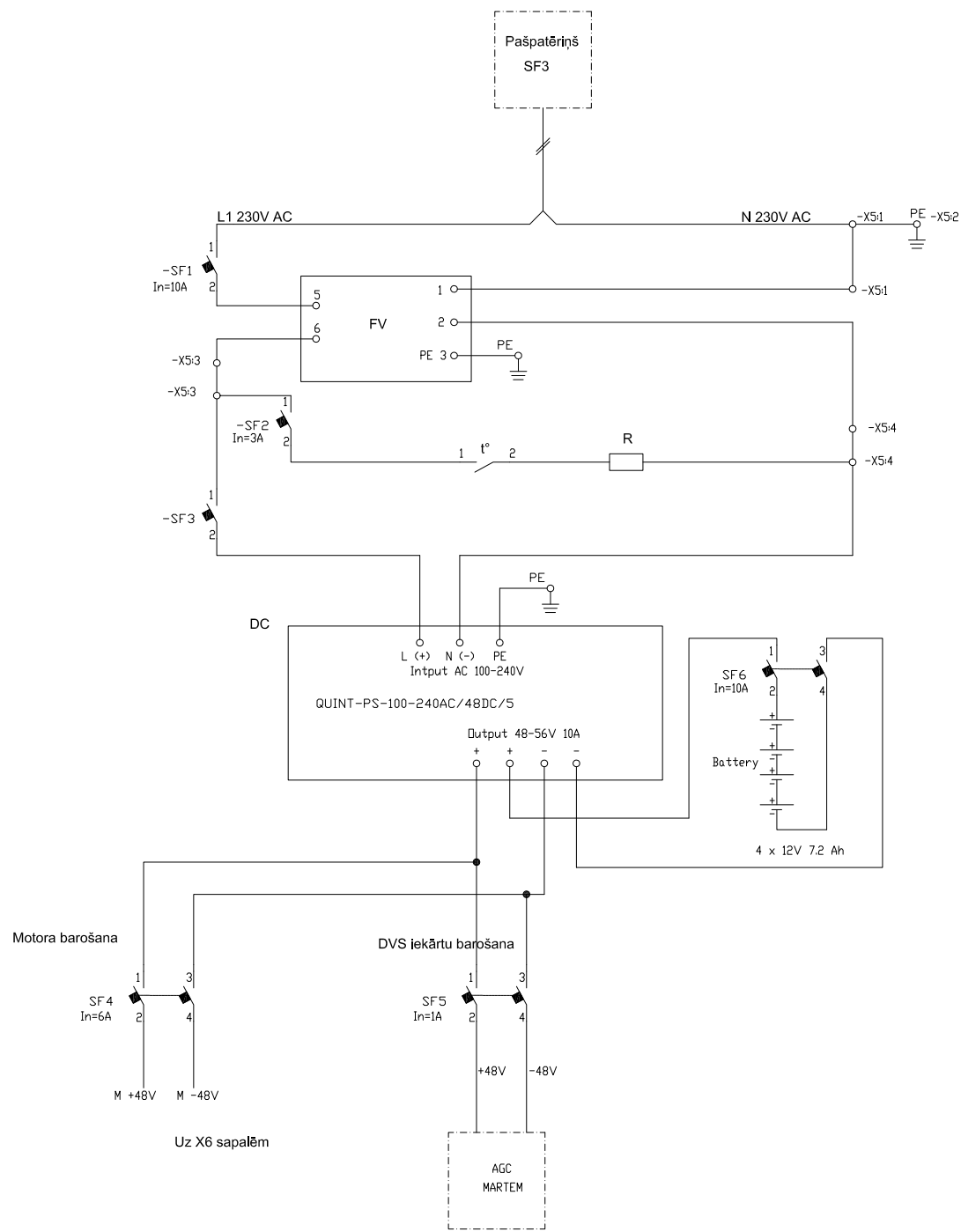
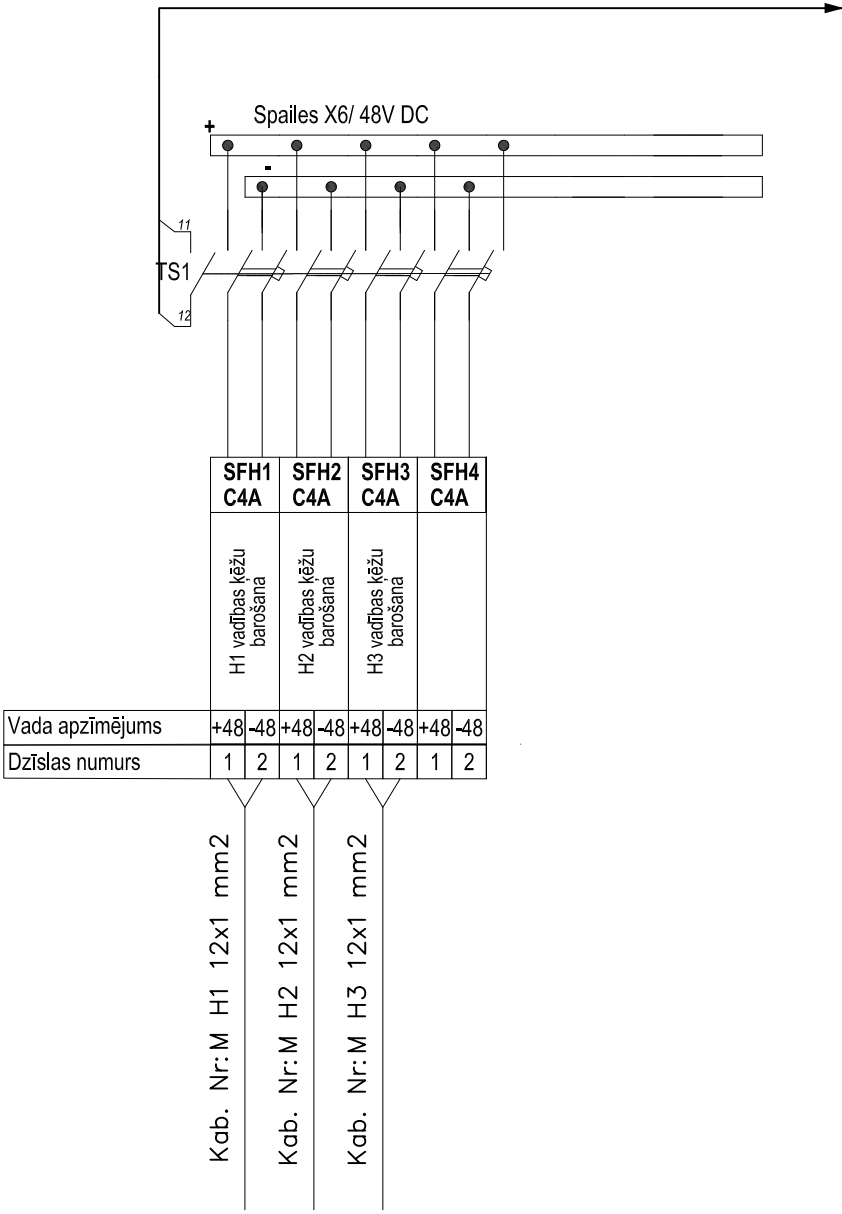
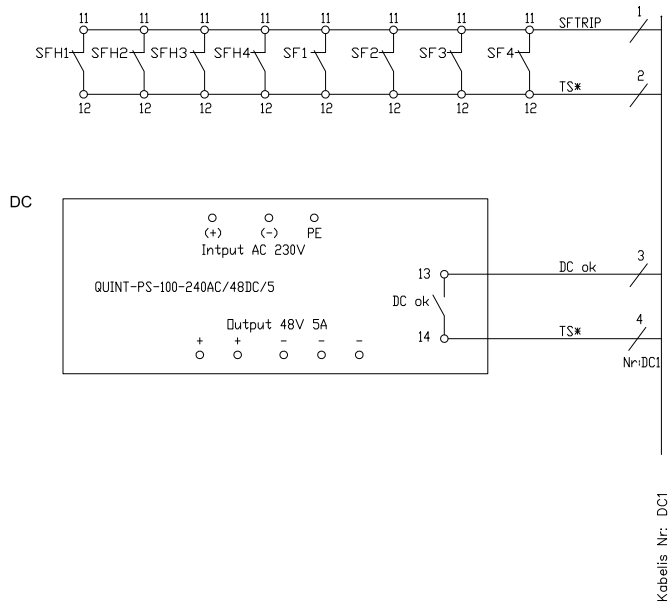
- visas sekundārās komutācijas ar slēgiekārtu;
- datu savākšanu;
- protokola konvertēšanu;
- komunikāciju ar LE ITT modemu.

SVS aprīkot ar apsildi un apsildes kontroli.

Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

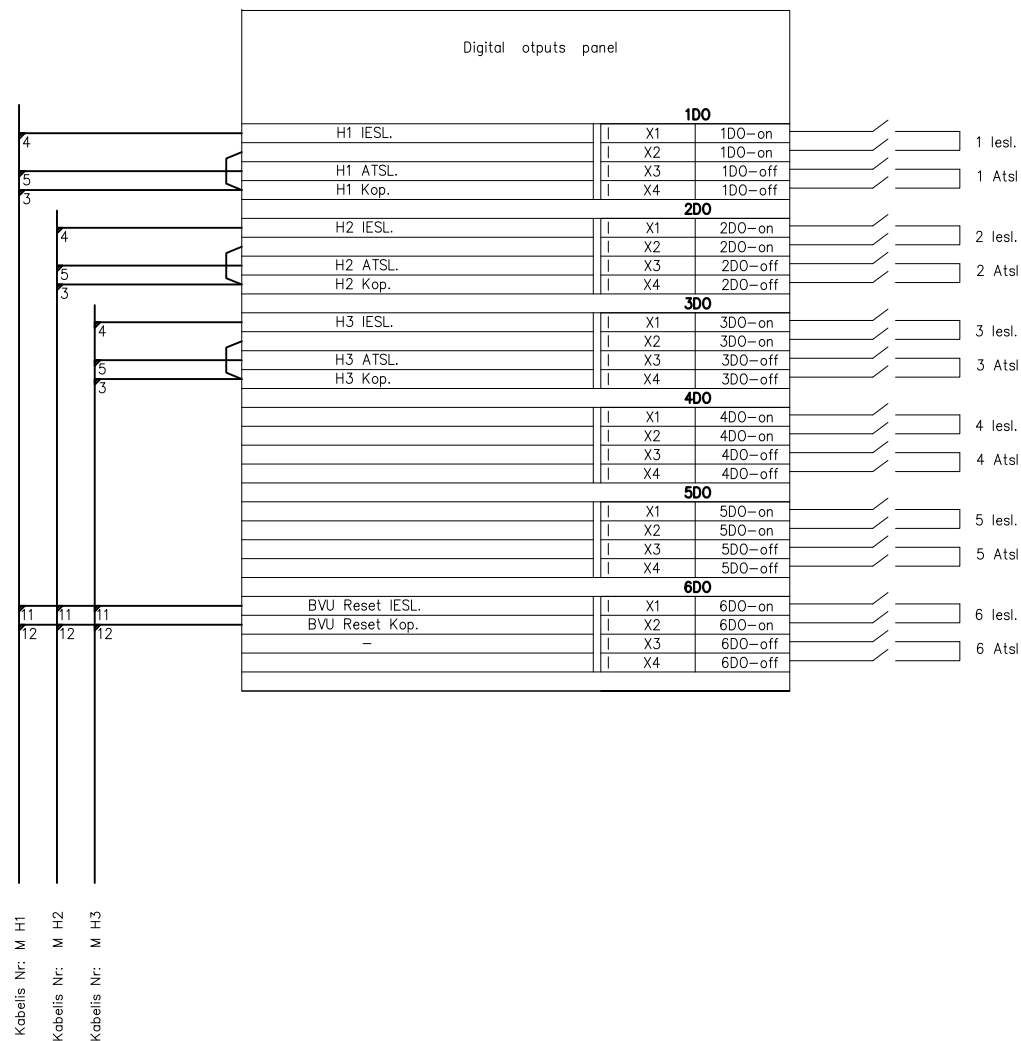
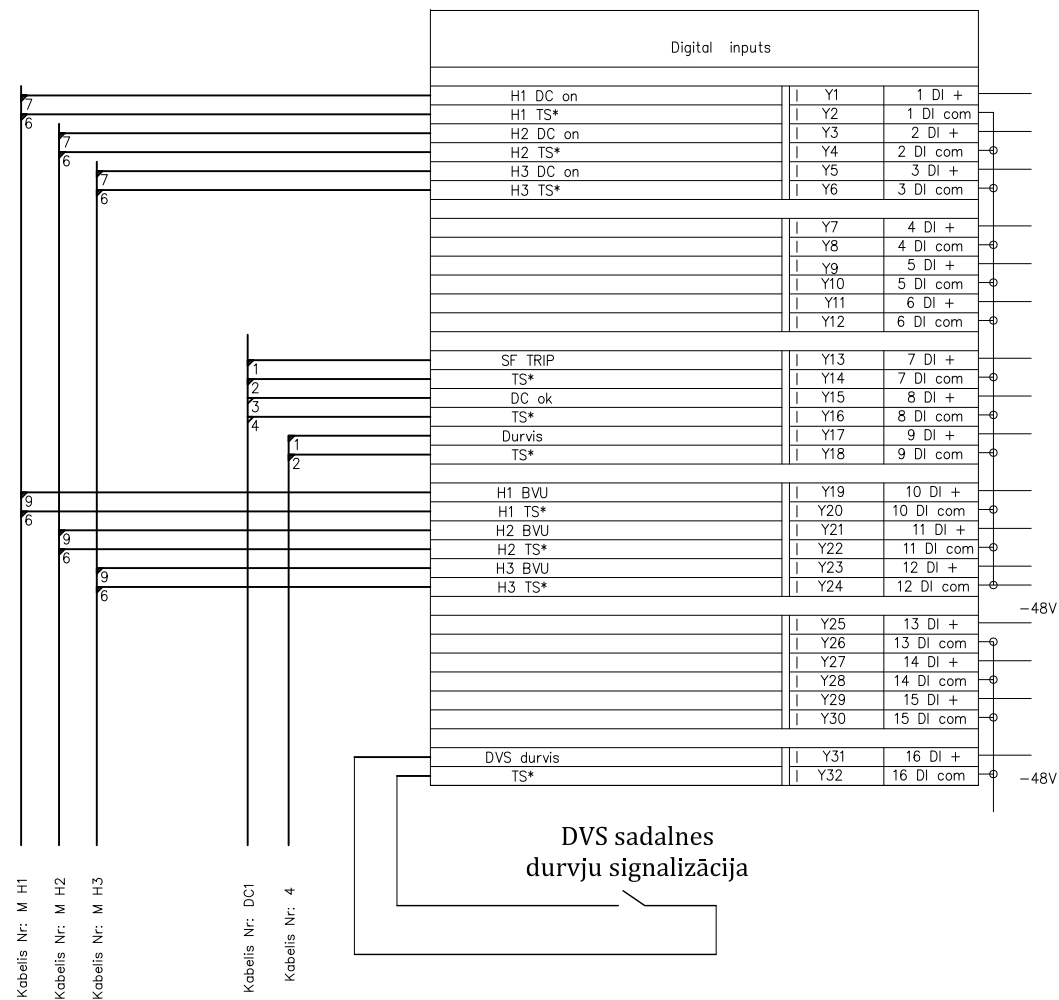
Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: DVS blokshēma		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA6-SH-1
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA6
						Mērogs: b/m

T75031

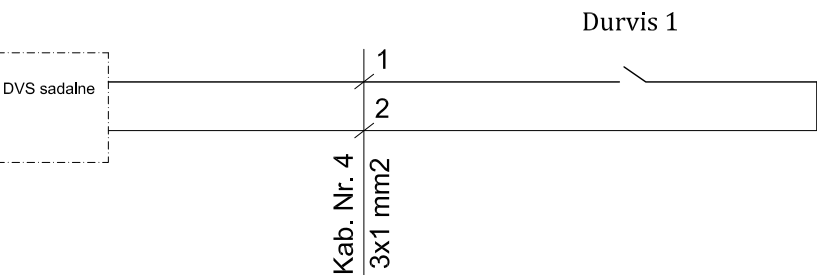


Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: Operatīvā līdzsprieguma ķēdes		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)			Lapas Nr. RAA6-SH-2
projektētājs	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)			Marka: RAA6
						Mērogs: b/m



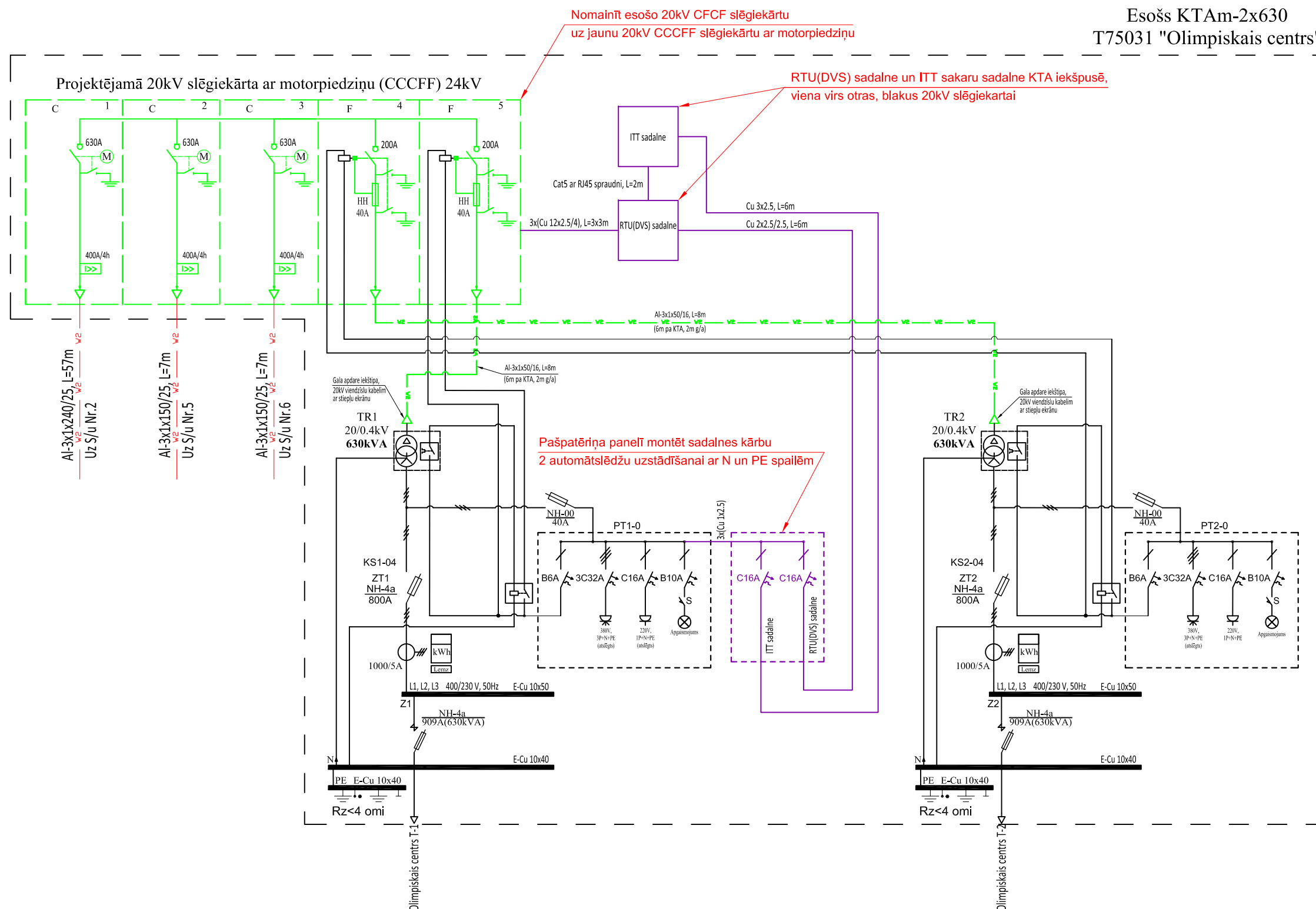
Ēkas durvju signalizācijas shēma



Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Projektēšanas uzdevums Nr. PU-5363 (TA-11121)	
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,				Rasējums: DVS bināro ieeju un izeju ķēdes		Nr: TA-11121	
proj. d. vad.	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)			Stadija: BP, TS	
projektētājs	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)			Lapas Nr. RAA6-SH-3	
						Marka: RAA6	
						Mērogs: b/m	

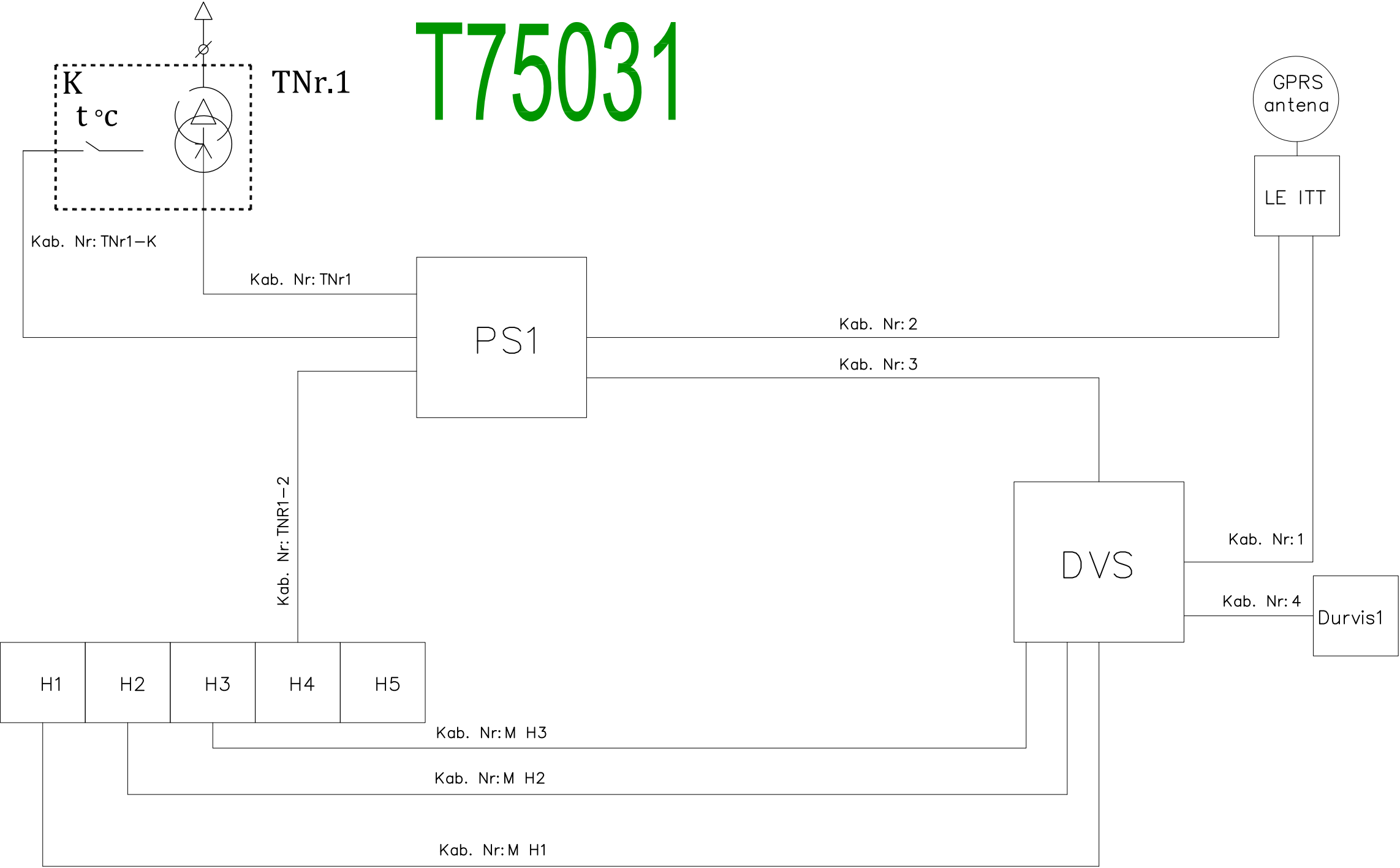
T75031

Esošs KTAм-2х630
T75031 "Olimpiskais centrs"



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

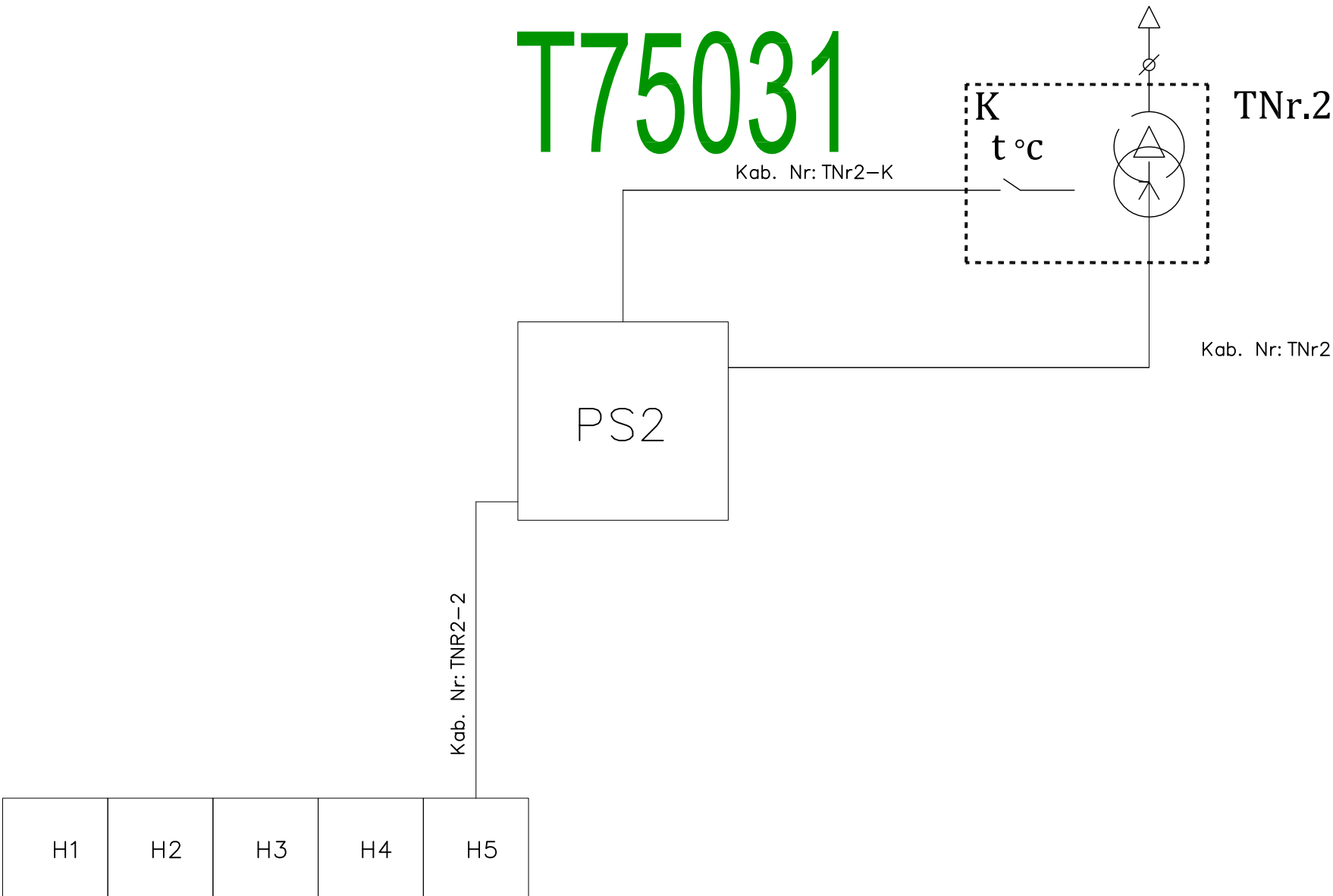
Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr.: TA-11121	
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201, 				Rasējums: Pašpatērīņa sadalne		Stadija: BP, TS	
proj. d. vad. M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Lapas Nr. RAA7-SH-1	
projektētājs M.Koljesņikovs (paraksts BIS) (skatīt BIS)						Marka: RAA7	
						Mērogs: b/m	



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

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Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: Kontrollkabeļu saišu shēma		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA8-SH-1
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA8
						Mērogs: b/m

T75031



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>				Rasējums: Kontrollkabeļu saišu shēma		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA8-SH-1
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA8
						Mērogs: b/m

Kabeļu žurnāls

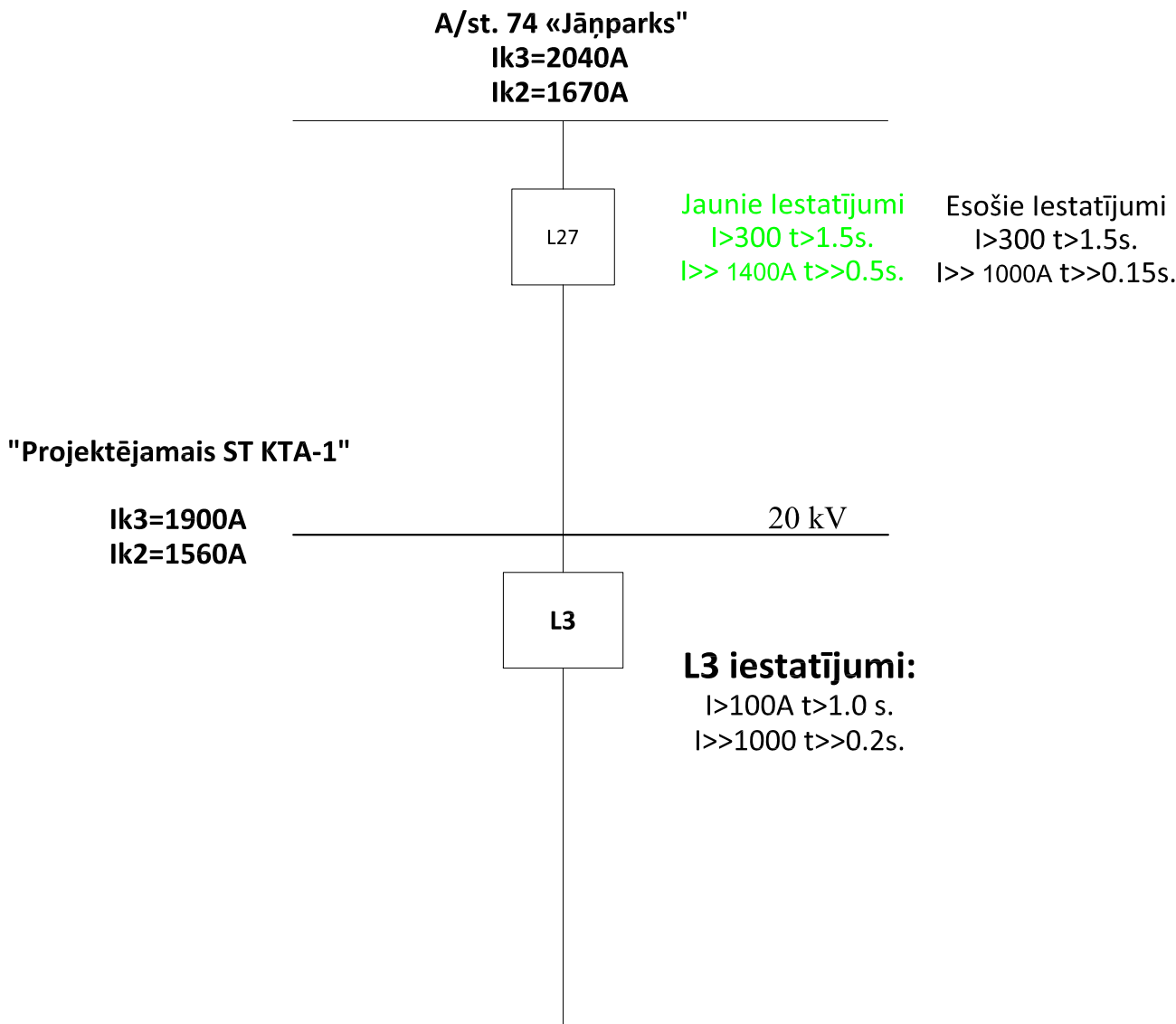
T75031

N.P.K	Kabeļa apzīmējums	Kabeļa virziens		Kabeļa dati			Piezīmes
		no kurienes	uz kuriem	Dzīslu skaits un šķ.	Rezerves dzīslas	Kabeļa garums	
1	M H1	Ligzda H1	DVS	12*0,75	2	10 m	
2	M H2	Ligzda H2	DVS	12*0,75	2	10 m	
3	M H3	Ligzda H3	DVS	12*0,75	2	10 m	
4	TNR1-K	TNr. 1	PS	3*1,5		10 m	
5	TNR1-2	PS	H4	3*1,5		10 m	
6	TNR2-K	TNr. 2	PS	3*1,5		10 m	
7	TNR2-2	PS	H5	3*1,5		10 m	
8	Nr. 1	DVS	LE ITT	Cat 5	-	10 m	
9	Nr. 2	PS	LE ITT	3*1,5	-	10 m	
10	Nr. 3	PS	DVS	3*1,5	-	10 m	
11	Nr. 4	Durvis 1	DVS	3*1,5		15 m	

Projektdarbu uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Smerļa iela 1, Rīga, LV-1160</small>				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small>						Stadija: BP, TS
						Lapas Nr. RAA9-SH-1
proj. d. vad.	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)	Rasējums: Kabeļu žurnāls		Marka: RAA9
projektētājs	M.Kolesņikovs	(paraksts BIS)	(skatīt BIS)			Mērogs: b/m

Projektā īsslēguma strāvas tika ņemtas no programmas «Trimble NIS Energy" iestatījumu izvēlei.



L3 ligzdas aprēķins un iestatījumu izvēle

Strāvmaiņa izvēle: CT Type: WIC1-W3
Rated CT current IS: 32-112A

Iestatījumi:
I>104A t>1.0s. (izvēlamies strāvas iesatījumu 104A, paredzēts uzstādīt 20kV uzskaiti ar 20kV strāvmaiņiem primārā tinuma strāvu 100A. Laika izvēlē tiek pielietots princips ne mazāk kā 0,3 sekundes līdz augstāk stāvošam jaudas slēdzim.);
I>> 1040A t>>0.2s. (Laika izvēlē tiek pielietots princips ne mazāk kā 0,3 sekundes līdz augstāk stāvošam jaudas slēdzim.)

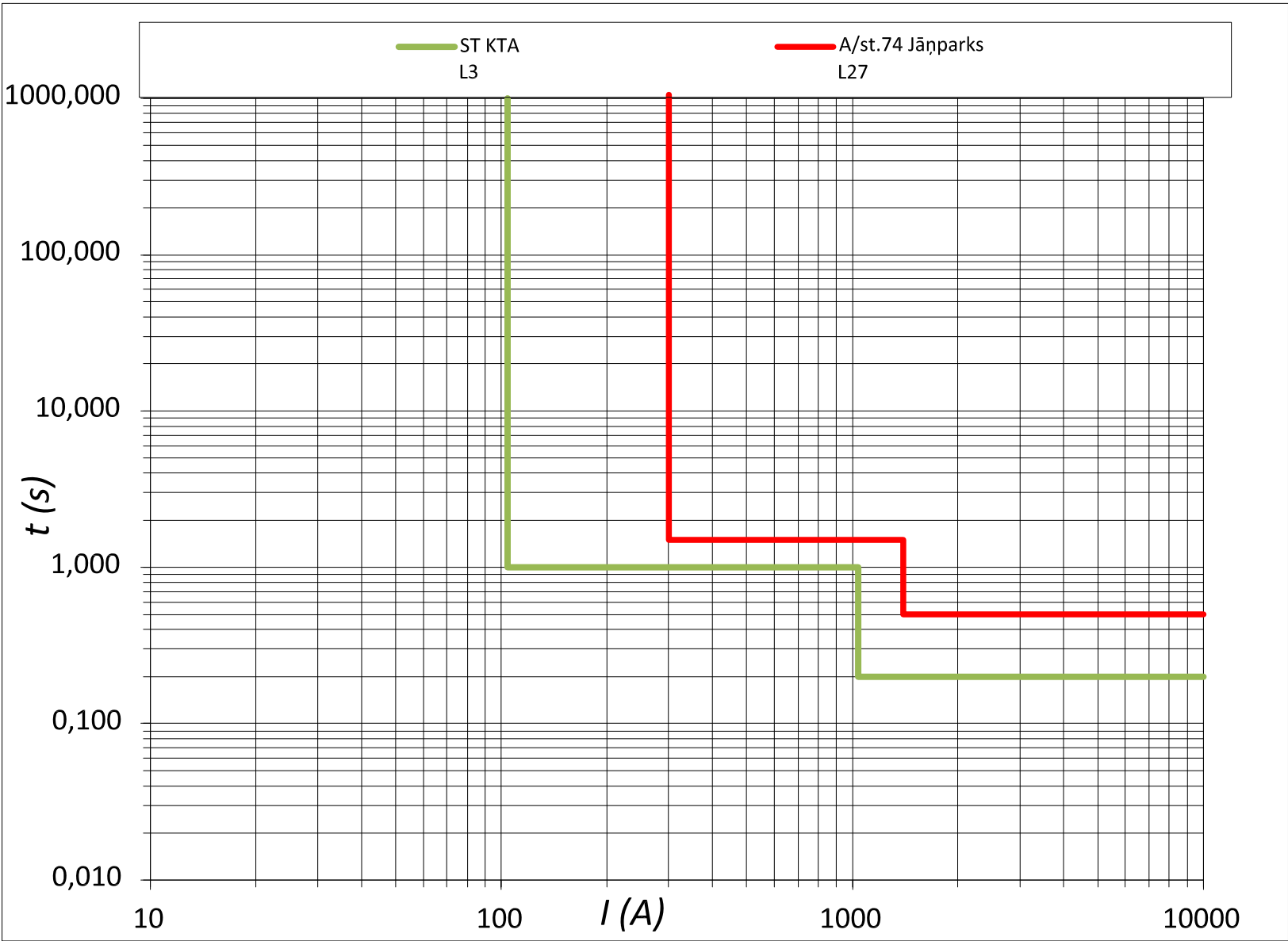
Iestatījumi SEG WIC relejam ligzdai L3

DIP1								DIP2							
WIC1-W3				Raksturlikne				I>				t>			
1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
OFF	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	ON	ON	OFF	OFF
Is=104 A				DEFT				1,0 x Is= 104 A				Time = 1 s			

DIP3								DIP4							
I>>				t>>				Ie >				te>			
1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
ON	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
10 x Is = 1040 A				Time = 0.2 s				Exit				Time = 20 s			

<div>Pasūtītājs: AS "SADALES TĪKLS" <small>Reģ.Nr.40003857687 Šmerļa iela 1, Rīga, LV-1160</small></div>				<div>Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā</div>				<div>Nr: TA-11121</div>		
<div>Projektētājs: SIA "WOLTEC" <small>Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201,</small></div> <div></div>								<div>Stadija: BP, TS</div>		
								<div>Lapas Nr. RAA10-SH-1</div>		
proj. d. vad.		M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)	<div>Rasējums: RAA iestatījumu aprēķins</div>				<div>Marka: RAA10</div>	
projektētājs		M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)					<div>Mērogs: b/m</div>	

Projektā izvēlēto iestatījumu skatījums logaritmiskā grafikā



Projektēšanas uzdevums Nr. PU-5363 (TA-11121)

Pasūtītājs: AS "SADALES TĪKLS" Reģ.Nr.40003857687 Šmerļa iela 1, Rīga, LV-1160				Būvprojekta nosaukums un adrese: 20kV elektropārvades līniju S137, S127 pārbūve, transformatora apakšstacijas T75031 automatizācija Rietekļa un Vaidavas ielās, Valmierā		Nr: TA-11121
Projektētājs: SIA "WOLTEC" Reģ.Nr.44103097350 Ausekļa iela 31, Valmiera, LV-4201, 				Rasējums: RAA iestatījumu aprēķins		Stadija: BP, TS
proj. d. vad.	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Lapas Nr. RAA10-SH-2
projektētājs	M.Kolesņikovs	(parakstīts BIS)	(skatīt BIS)			Marka: RAA10
						Mērogs: b/m

EARTH-FAULT AND SHORT-CIRCUIT INDICATOR

TYPE EKL3.2

panel mounted

General description

The earth-fault and short-circuit indicator can be used in radial networks with one input and open-ring networks which are solidly earthed or low resistance earthed.

The potential-free connection between the short-circuit sensors and the display unit is done by fibre optic cables. The sensors can be mounted on screened and unscreened cables.

The connection between the earth-fault sensor and the display unit is done by cable. The sensor must be mounted on screened cables. All sensors are divisible and can be retrofitted on the cable.



Features and Options

Permanent earth-faults:	Indication of permanent earth-faults by double blinking of the earth-fault LED.
2nd short-circuit pass-through:	Indication of a second short-circuit passing through by double blinking of the respective short-circuit LED.
Separate response delays:	The response delay for short-circuits and earth-faults can be adjusted individually.
Optional two relays:	The indicator can be equipped with two remote contact relays to indicate earth-faults and short-circuits separately.
Optional reset input:	For reset by recovering auxiliary voltage supply (V DC or V AC)
Optional sensor reset:	Sensor reset on recovering net current
Optional power supplies:	10-110 V DC or 110 / 230 V AC power supply with optional lithium backup battery

External connectors

Optical terminal:	short-circuit sensors L1, L2 and L3
Connector 7 - 8:	earth-fault sensor
Connector 9 - 10:	external blinking lamp (Type BL4.1+BL6)
Connector 10 - 11:	Remote reset input
Connector 13 - 15:	SCADA change-over contact (figure 1)
Connector 16 - 17:	external power supply

Optional two relays (figure 2):

Connector 12 - 13:	SCADA remote contact for short-circuit
Connector 14 - 15:	SCADA remote contact for earth-fault

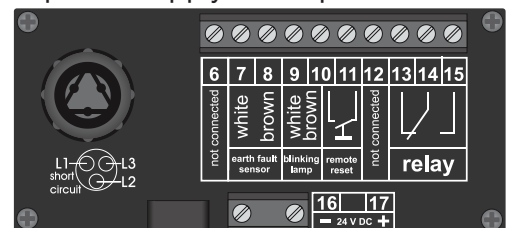


figure 1 - Connectors one relay version

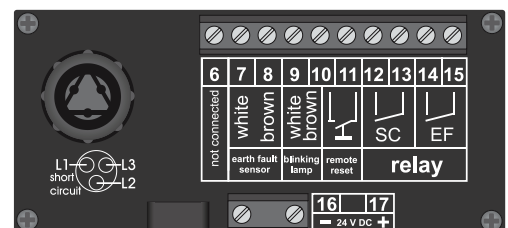
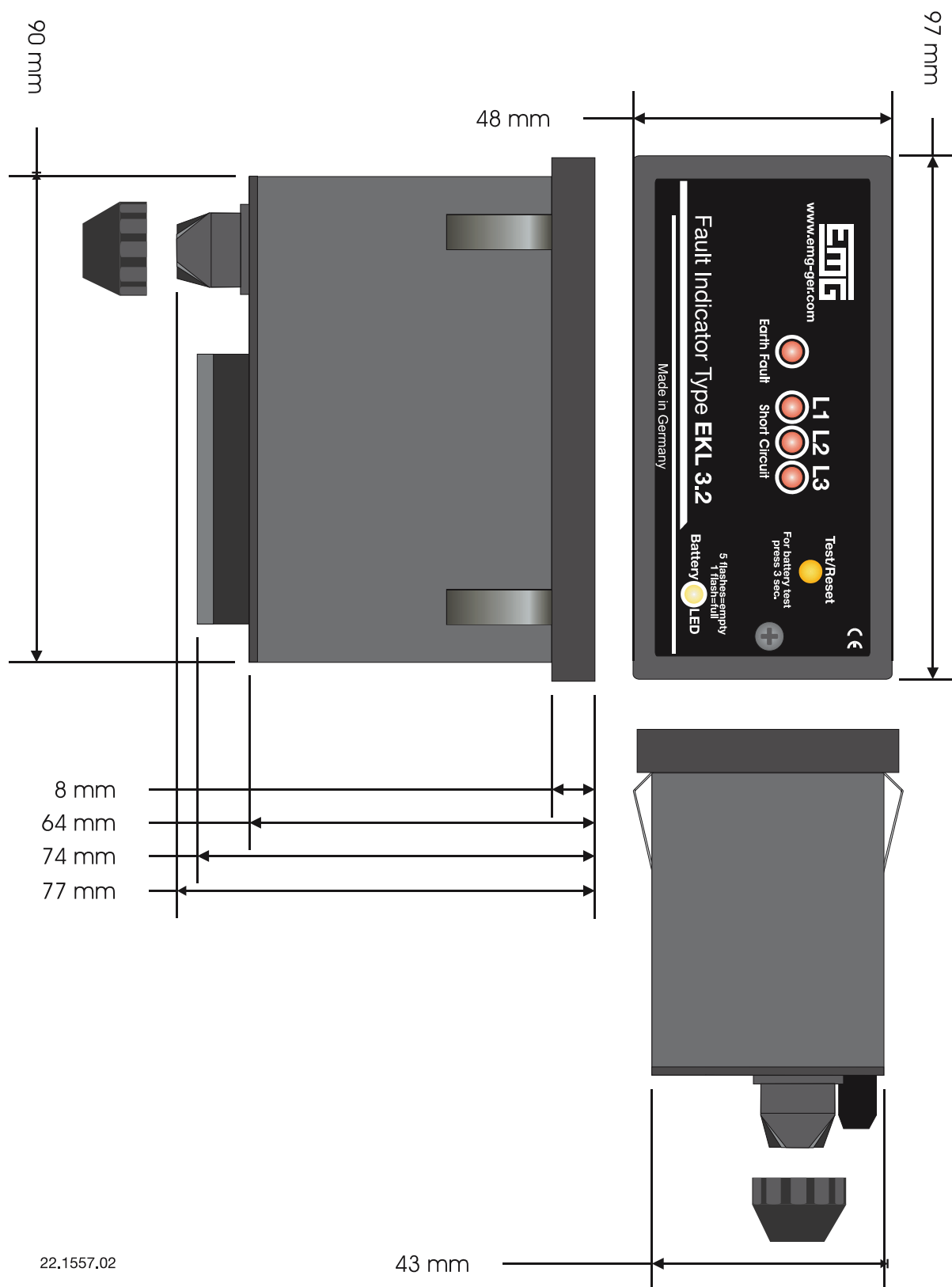


figure 2 - Connectors two relay version

General Data

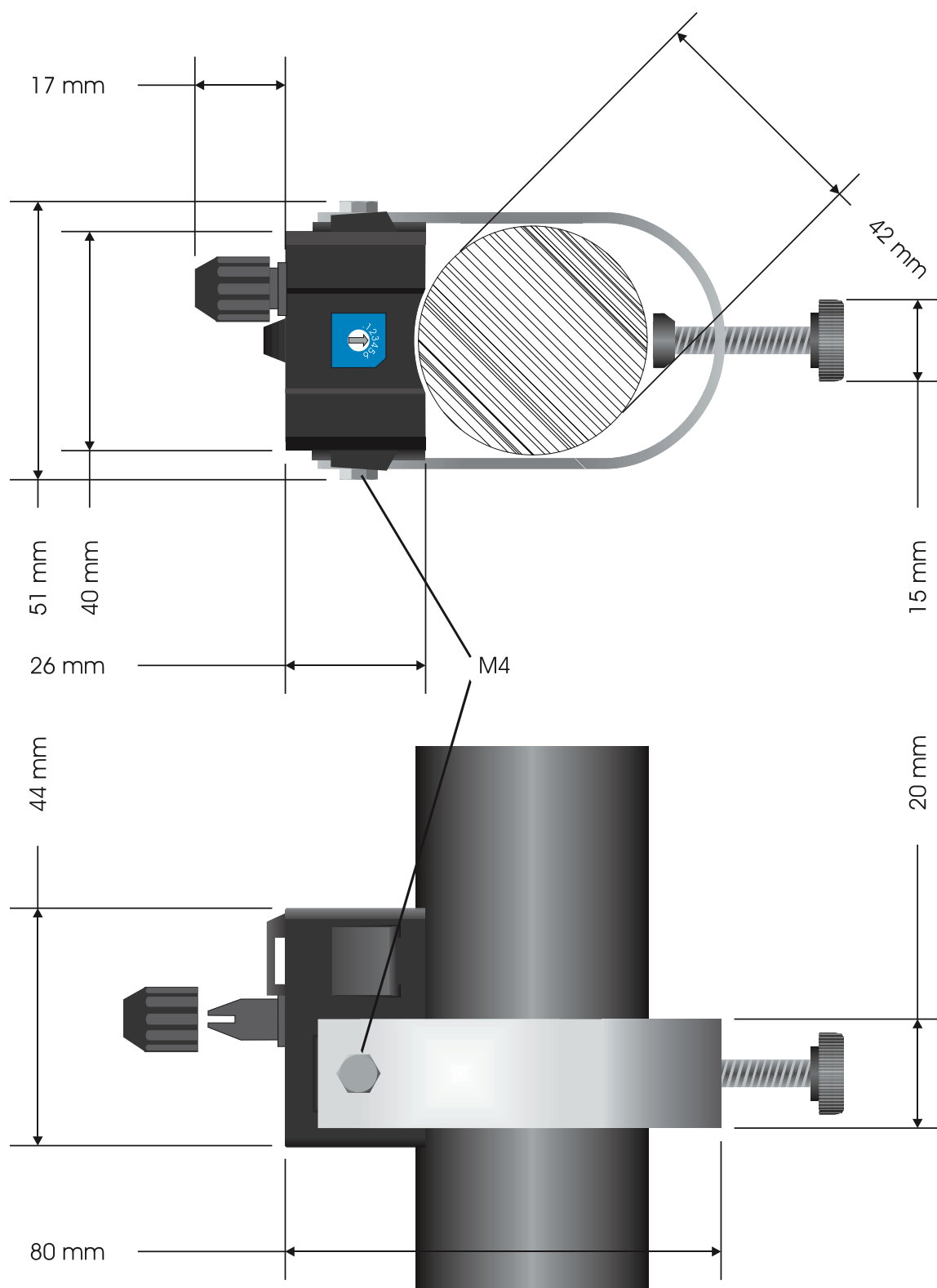
Subject	Value
short-circuit trip current (phase to phase)	adjustable: 200 / 300 / 400 / 500 / 600 / 800 / 1000 * A ($\pm 10\%$)
earth-fault trip current (phase to ground)	adjustable: 10 / 20 / 40 / 60 / 80 / 100 * A ($\pm 10\%$)
response delay short-circuit	adjustable: 40 / 60 / 80 / 160 * ms
response delay earth-fault	adjustable: 40 / 60 / 80 / 160 * ms
indication unit	suitable for panel installation
indication of a) short-circuit b) earth-fault c) battery	a) one red LED for each phase b) one red LED for earth-fault c) one yellow LED
reset of the indicator	a) manual by push-button b) connection for a potential-free remote reset c) time*: 1 / 2 / 4 / 8 ($\pm 1\%$) hours after fault Optional: d) self-acting after recovering of 230 V AC Optional: e) sensor reset after recovering net current
on site function test a) function test b) battery test	by push-button a) the button has to be pressed for 1 second b) the button has to be pressed for 3 seconds
dimensions: indication unit	(WxHxD) 97 mm x 48 mm x 77 mm (dimensions of the cut out: 92+0.8 x 45+0.6 mm / IEC 61554 / DIN43700)
Protection class: indication unit	IP40
Protection class: sensors	IP67
internal type test	according to IEEE 495-2007
operation temperature range	-25°C to +70°C
power supply	lithium battery (LiSOCl ₂) type AA / 3.6V / 2600 mAh Optional: 10-110 V DC with lithium backup battery type AA / 3.6V / 2600 mAh Optional: 110 / 230 V AC with lithium backup battery type AA / 3.6V / 2600 mAh
SCADA contact	1x change-over contact Optional: 2x NO (separate earth-fault and short-circuit indication) permanent / wipe contact (100ms) (can be selected on site by a dip switch) max. 230 V AC / max. 2 A / max. 30 W
short-circuit sensor (CT)	three short circuit sensors type LK (current transformers for single-core cable) diameter: 22-42* mm connection cable length: 3* m (fibre optic cable)
earth-fault sensor (CT)	one earth-fault sensor type SE (current transformers for a three-core cable) diameter: 80-100* mm connection cable length: 3* m (copper cable)

*PLEASE NOTE: other values can be ordered

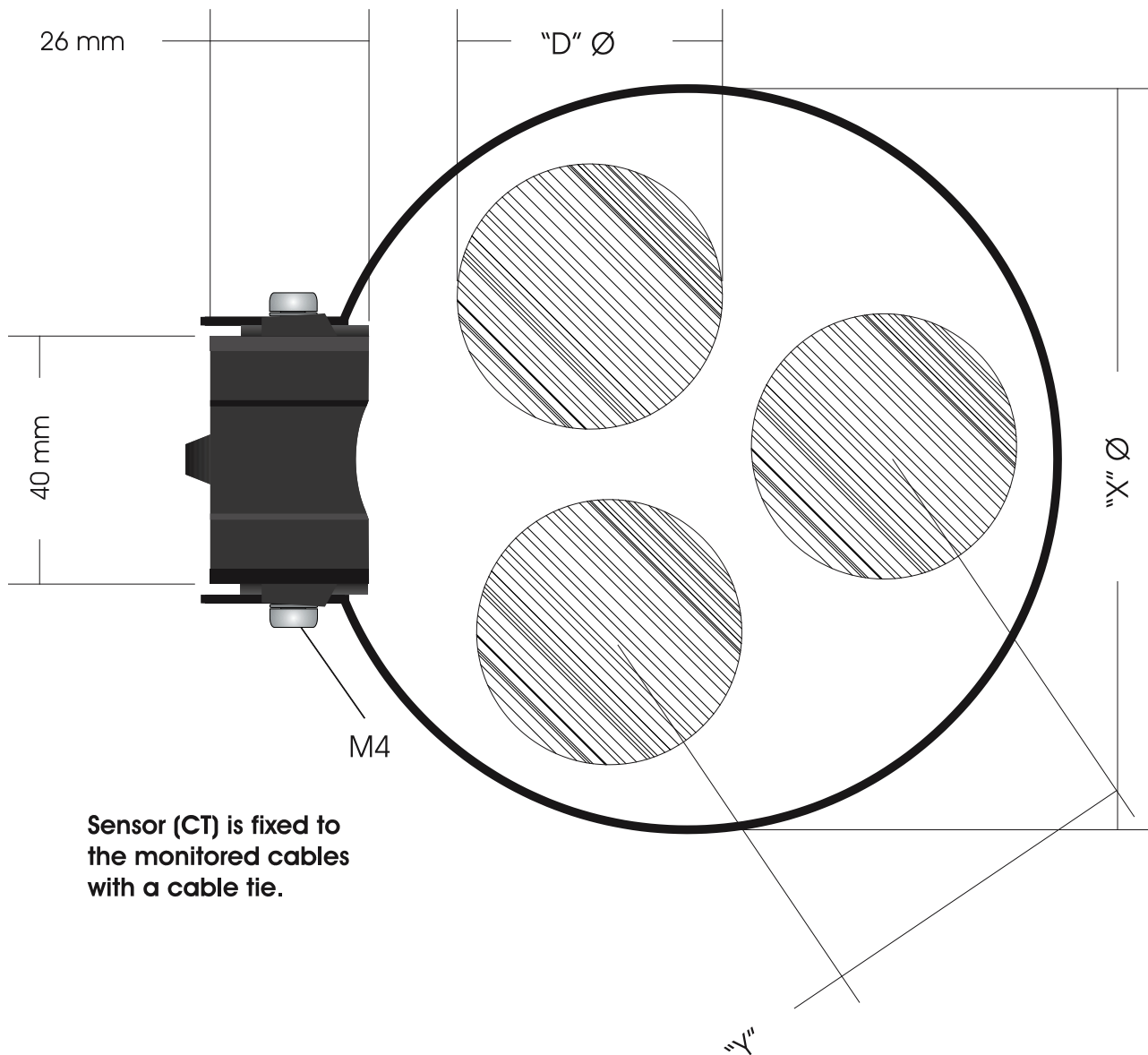


22.1557.02

43 mm

Short-circuit sensor type LK

12.1424.10

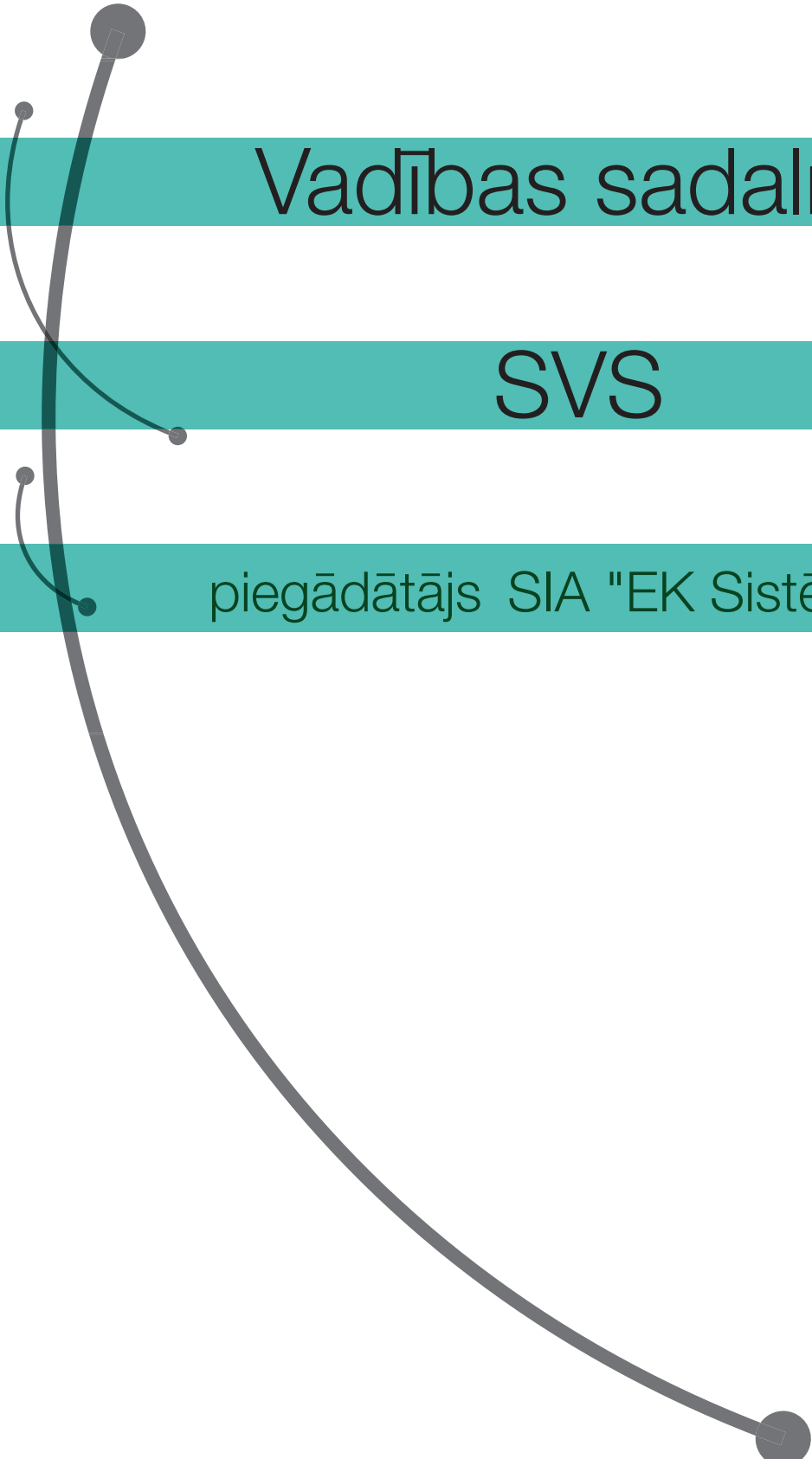
Earth-fault sensor type SE

Sensor (CT) is fixed to
the monitored cables
with a cable tie.

Verbindungskabel/connection cable:

- LIYY 2 x 0,5 mm²
- PB-free
- Ø = 5 mm
- length customer specific

12.1449.05



Vadības sadalne

SVS

piegādātājs SIA "EK Sistēmas"

Vadības sadalne (SVS)

Sadalnes apzīmējums:

SVS

Sadalne SVS nodrošina slēgiekārtas motora piedziņas vadību un signalizāciju. Šo funkciju nodrošina firmas Martem kontrolieris "TELEM-AGC" RTU. TELEM – AGC.

- Sadalne SVS galvenās komponentes ir:
- Digitālo ieeju bloks (DI);
- Digitālo izeju bloks (DO);
- Garantētas barošanas bloks (GB);
- Datu saņemšanas un pārraides bloks -RTU.

Sadalni SVS ir paredzēts lietot attālināti. Iekārtas palaišanu no sadales var veikt tikai speciāli tam apmācīts personāls.

Sadalnes SVS patstāvīgi tiek pieslēgta pie 230 V AC tīkla sprieguma.

Garantētā barošana veic akumulatoru uzlādi, RTU un SVS līdzsprieguma nodrošināšanu. Ja pazūd 230 V AC, tad SVS, RTU un slēgiekārtas vadības ķēdes automātiski pāriet barošanā no akumulatoriem.

No akumulatoriem sadalne SVS ir spējīga darboties 24 stundas pie nosacījuma, ka veiktas darbības nepārsniegs 15 ciklus.

Sadalnē SVS ir nodrošināta ar apsildi un ventilāciju.

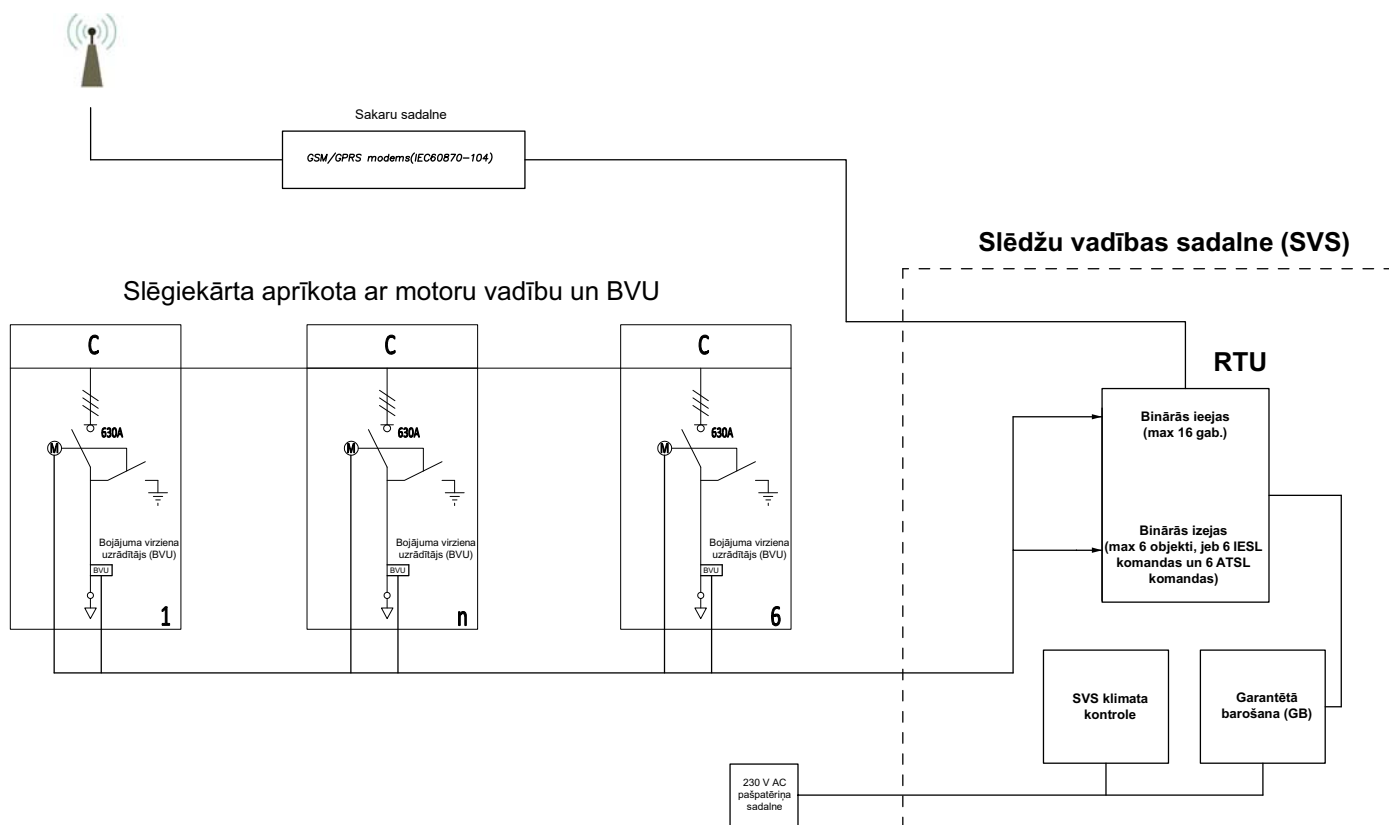
SVS/24 VDC tehniskie parametri:

- Izmērs- 450x450x250mm
- Apkartējas vides temperatūra: -25 +40°C
- Vides mitrums: līdz 90%
- Veicamo darbību mehāniskais resurss: 5000 cikli
- U ieejā – 230 VAC
- I ieejā – 10 A
- U izejā – 24 V DC
- Akumulators – 2x12 Ah
- Datu standarts – IEC60870-5-104
- Sadales durvju pozīcijas kontakts

SVS/48 VDC tehniskie parametri:

- Izmērs- 450x450x250mm
- Apkartējas vides temperatūra: -25 +40°C
- Vides mitrums: līdz 90%
- Veicamo darbību mehāniskais resurss: 5000 cikli
- U ieejā – 230 VAC
- I ieejā – 5 A
- U izejā – 48 V DC
- Akumulators – 4x9 Ah
- Datu standarts - IEC60870-5-104
- Sadales durvju pozīcijas kontakts

Sadalnes SVS principshēma:



Sadalnes SVS foto:



Sadalnes SVS korpusa apraksts:

Sadalne ir izgatavota atbilstoši EN 60439 prasībām un marķēta ar CE zīmi. Sadalnes korpuss ir izgatavots no cinkota 2mm bieža tērauda DX51 loksnes (klase C4, SFS EN-ISO 12944-2). Tērauda loksne pārklāta ar UV izturīgu cinka pārklājumu. Cinka pārklājuma biezums $\geq 42 \mu\text{m}$. Sadalnes korpusa kalpošanas laiks 30 gadi, ievērojot ekspluatācijas noteikumus, darba režīmu un vides apstākļus.



WIC1 – CT Powered Time Overcurrent And Earth Current Relay

(July 2008)

Manual WIC1 (Revision New)

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1. Introduction

SEG protection relays of the WI-LINE are offering time over current protective functions and earth fault protective functions in the well-proven technique for CT powered protection relays. As combination of a compact protection relay and related core-type transformer, the WIC1 system was especially developed for compact MV switchboards with circuit breakers.

1.1 How to use this instruction

In this instruction the technical description of all WIC1 versions is included. The user is given a comprehensive insight into the various applications, the selection, installation, setting of parameters and putting into operation of the WIC1.

This instruction is divided into the following sections:

Chapter 1;	Introduction
Chapter 2;	Handling, installation and outside dimensions
Chapter 3;	Operating instructions
Chapter 4;	Technical data, characteristics and features
Chapter 5;	Commissioning and maintenance
Chapter 6;	Product specific features
Chapter 7;	Annex; Dimensional drawing and flag indicator, Order form and commissioning form

1.2 Introductory remarks on the WIC1

The requirements on MS distribution stations with circuit breakers call for a robust protection relay which is optimised accordingly and an integral part of the respective switchboard. The WIC1 is a time over current relay SEG has developed specifically for such requirements.

The WIC1 is a CT-powered protection relay with minimal space requirement which complies with the highest demands on a digital protection device. Simple but safe wiring, high electromagnetic interference immunity, uncomplicated adjustment and the ability to scale to different power quantities of the switchboard, helping the switchgear manufacturer to minimize costs. By developing the WIC1 we are also able to present a protective system with a guaranteed maintenance-free period of 25 years, the same as for the switchboard.

1.3 Product description

The WIC1 is a CT-powered protection relay with inverse time and definite time protection characteristics and is specifically designed for switchboards with CBs and small rated output currents.

Together the specific CTs and the WIC1 form a joint protective system. A low-energy coil is needed for realising trip of the CB.

Parameter setting can be done in different user-friendly ways. By means of casting all electronic components incl. the housing are safely protected against climatic and mechanic influences.

In the WIC1 the following protection functions are realized:

- 3 phase definite time over current and short-circuit protection with variable tripping times (ANSI 50/51)
- 3 phase over current protection with selectable inverse time characteristics and definite time short-circuit current element (ANSI 50/51)
- definite time earth over current protection by internal calculation (ANSI 50N/51N)

2. Handling, Installation and Outside Dimensions

2.1 General information

2.1.1 Upkeep of the relay

As a rule protection relays are of robust construction and the WIC1 in particular allows operation under extreme environmental conditions. But despite these facts, the WIC1 should be handled with the necessary care during installation and commissioning. Immediately after receipt of the relay it should be checked for possible damage inflicted during transportation. Any transport damage has to be notified to the transport firm handling the consignment.

Those relays which are not installed immediately should be stored in their original package (styro-foam).

2.1.2 Storage

If the relay is not used directly it has to be stored in its original packing. Permissible temperatures during storing are -40°C up to +85°C. The storage place should be dry.

2.1.3 Electrostatic discharge

The electronic components used in the relay react very sensitive to electrostatic discharge but they are absolute safely placed inside the plastic housing. Additionally all electronic components are well protected by means of casting. Hence it is practical impossible that components are damaged by ESD.

There are no setting or calibrating appliances inside the housing, which would call for opening the device by the user. The housing is hermetically sealed and cannot be opened without causing damage.

2.2 Installation of the relay

By using the three 7mm□ drill holes, the relay is directly mounted onto the mounting plate. Detailed drawing with all measurements can be found under 8.1.

2.3 Outside dimensions

All WIC1 types are of standardized design.

Weight:

700g

Dimensions: (Width x Height x Depth)

125x170x40mm

2.4 Connection Diagram

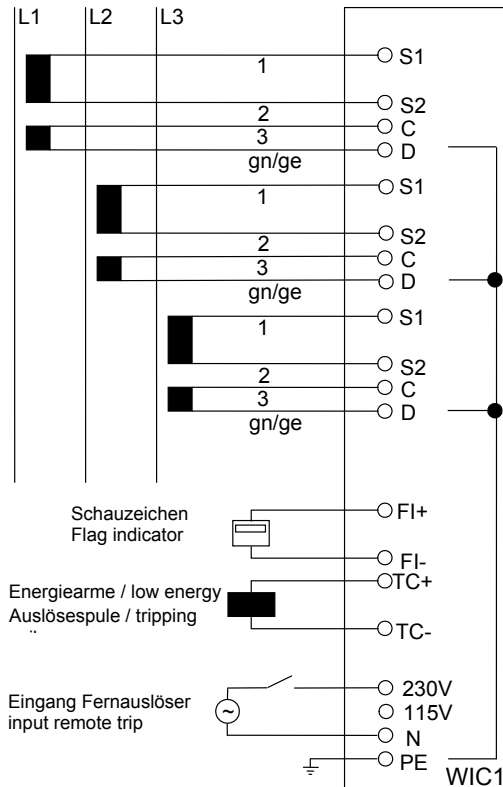


Figure 2.1: Connection diagram

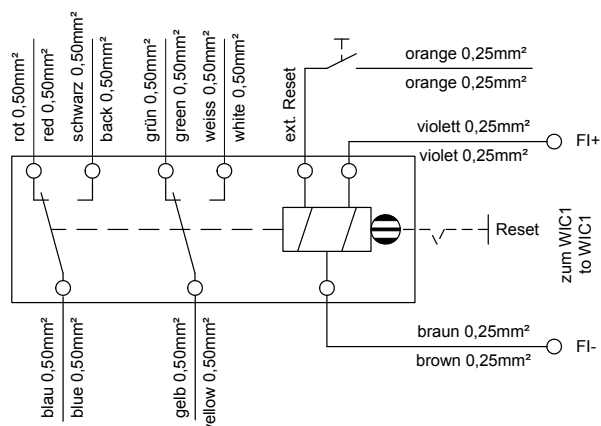


Figure 2.2: Connection diagram WI-SZ5 flag indicator

3. Operating instructions

3.1 General information on the WIC1

All available versions of the WIC1 relay are a high-tech and cost-optimized protection for MV switchboards. Specifically in compact switchboards, the WIC1 protection system in combination with a circuit breaker can replace the combination of load-break-switch with HV fuses. Thereby in particular the overload protection for the attached unit is improved clearly.

When power distribution networks are extended more and more high powered transformers are used and here HV fuses are inadmissible. For such applications the WIC1 protection system is an optimal replacement.

All WIC1 versions are provided with three analogue measuring inputs (3x phase current). The current measuring inputs are specially adjusted to the CTs allocated to the WIC1 protection system. There are 4 different CT ratios available for the protection system WIC1 which are conditional on the rated system current. The successive development towards the application time over current protection makes the system very user friendly. Setting of parameters as well as reading of tripping values is done via the integrated interface. For this the user has one PC adapter and the software "WIC-Soft1" at hand. The software is available in two versions, i.e. for installation on a WINDOWS PC and also for standard Palm Top Computers.

As an alternative to the adjustment via interface it is also possible to do this by means of DIP switches (for relay version WIC1-2) or by HEX switches (for relay version WIC1-3).

Cumulative current formation for earth current detection is programmed in the relay. The earth current is calculated from the three phase currents.

The WIC1 is provided with an input for remote tripping to which 115 VAC or 230 VAC can be connected. Tripping is realised via the electric impulse output after max. 1s.

A mechanical flag indicator WI1-SZ4 can be installed for optical signaling occurrence of trip conditions.

Furthermore it is possible to signal a trip event potentially free via the flag indicator WI1-SZ5. For this purpose the flag indicator is equipped with two changeover contacts.

For versions WIC1-2/-3 activation of the relay is signaled by a LED which is above the switches and protected by the clear plastic cover.

In order to simplify protective tests, the WIC1 has test sockets for connection of measuring lines of a three-phase testing device which are used for feeding the CT test winding. Through this the entire protection system (CTs, protection devices, tripping coil) incl. the wiring can be tested.

3.2 User interface

3.2.1 WIC1-1/WIC1-4

Pursuant to the intended maintenance-free design and for reducing cost there is no user interface with LED indicators and display. The setting values of the protective functions can be recorded directly at the protection relay.

For the basic version WIC1-1 the adjustment of protective functions can only be done via the communication interface which is placed above the terminal blocks at the left of the device.

The adjustment can take place by means of PC. For the short-circuit element here a separate password is needed. Factory setting this is "SEG".

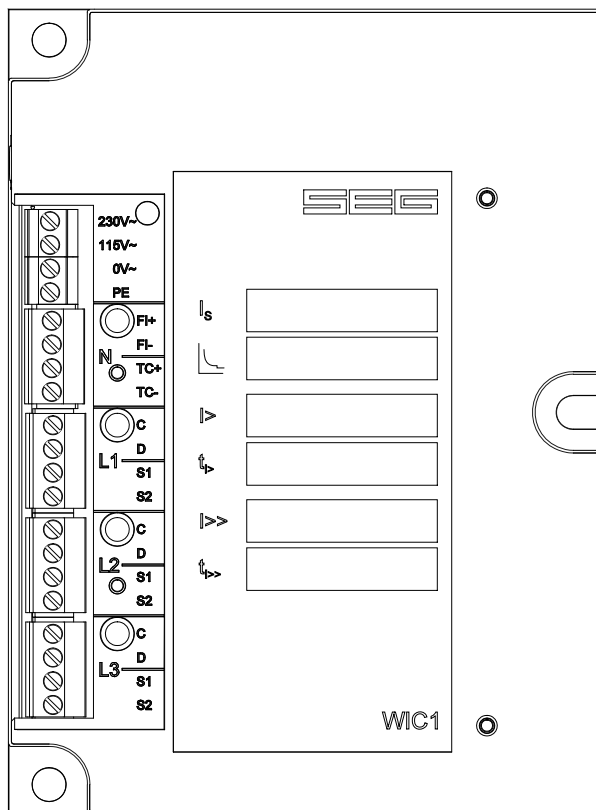


Figure 3.1: WIC1-1

When compared to WIC1-1, the WIC1-4 provides an additional operator interface at its front panel. Position and function are the same as for all other unit versions.

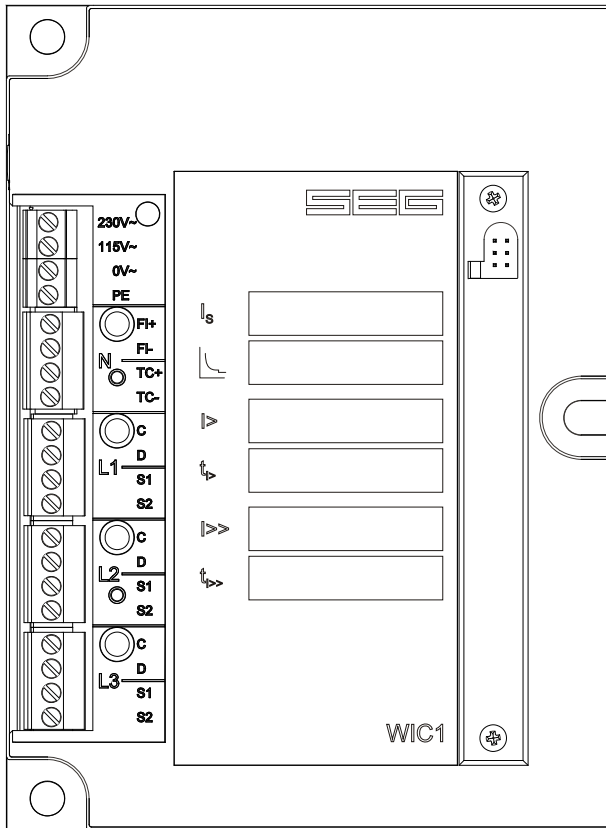


Figure 3.2: WIC1-4

Note!

For the operating software “WIC-Soft1” a separate description is available.

3.2.2 WIC1-2

For the relay version WIC1-2 the adjustment of protective functions can be done via DIP switches; there are 4 DIP switches for binary coded setting of one protective parameter.

Because there are only 16 steps available for setting the individual protective parameters, scaling is more coarse than this is the case with parameter setting via software.

For the relay version WIC1-2 setting of parameters via interface is not possible any more, but it is possible to read-out the stored fault values as well as the setting values of the WIC1.

The interface for this version can be found at the left of the relay and additionally above the DIP switch block.

Switch block; Switch No.	Setting parameter
1; 1-4	I_S : Rated CT current
1; 5-8	Choice of characteristics
2; 1-4	$I_{>}$: Pick-up value of the definite time over current element or start value of the inverse time characteristic.
2; 5-8	$t_{I>}$: Tripping time of the definite time over current element or factor "a" of the inverse time characteristic
3; 1-4	$I_{>>}$: Pick-up value of the short-circuit element
3; 5-8	$t_{I>>}$: Tripping time of the short-circuit element
4; 1-4	$I_{E>}$: Pick-up value of the definite time earth over current element
4; 5-8	$t_{I_{E>}}$: Tripping time of the definite time earth over current element.

If there is no earth fault function, the DIP switch block 4 is not incorporated.

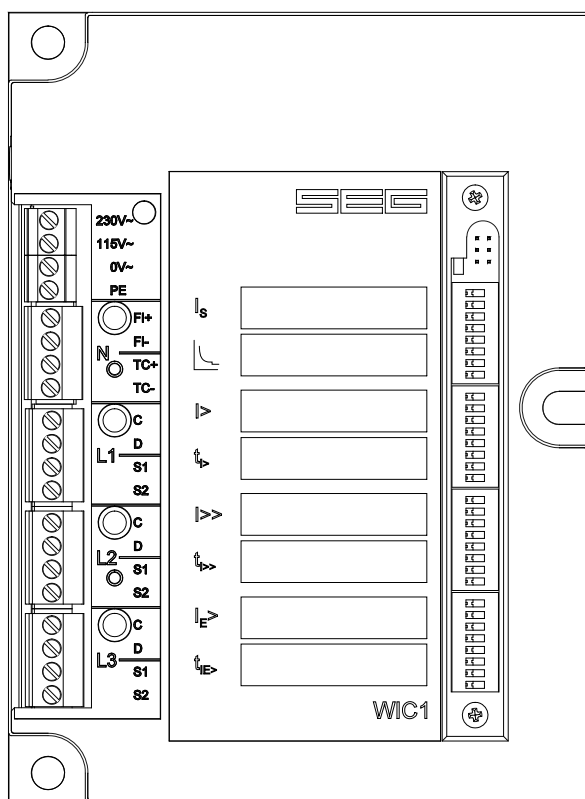


Figure 3.3: WIC1-2

3.2.3 WIC1-3

For the relay version WIC1-3 the adjustment of protective functions can be done via HEX switches at the protection relay.

Because there are only 16 steps available for setting the individual protective parameters, scaling is more coarse than this is the case with parameter setting via software.

For the relay version WIC1-3 setting of parameters via interface is not possible any more, but it is possible to read-out the stored fault values as well as the setting values of the WIC1.

The interface for this version can be found at the left of the relay and additionally above the HEX switch block.

The following parameters can be set for the relay version with integrated earth fault protection function.

Switch	Setting parameter
1	I_S : Rated CT current
2	Choice of characteristics
3	$I_{>}$: Pick-up value of the definite time over current element or start value of the inverse time characteristic
4	$t_{I>}$: Tripping time of the definite time over current element or time factor "a" of the inverse time characteristic
5	$I_{>>}$: Pick-up value of the short-circuit element
6	$t_{I>>}$: Tripping time of the short-circuit element
7	$I_{E>}$: Pick-up value of the definite time earth over current element
8	$t_{IE>}$: Tripping time of the definite time earth over current element

If there is no earth fault function, the HEX switches 7 and 8 are not incorporated.

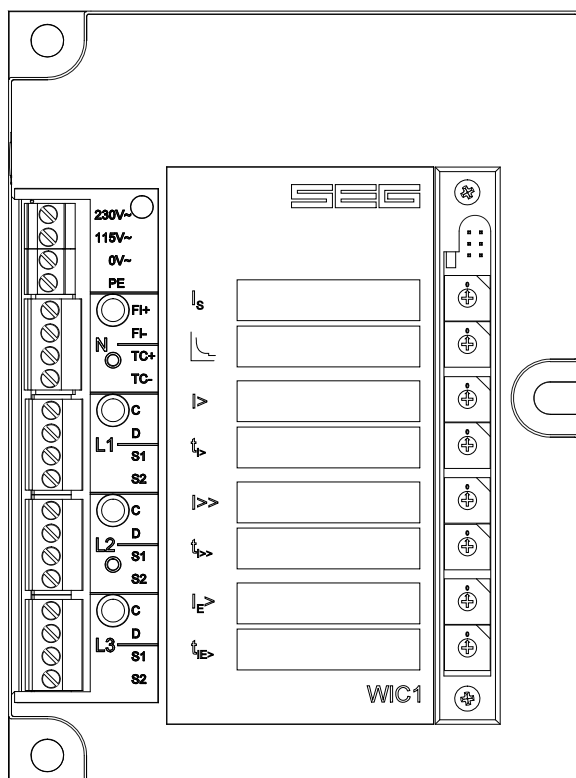


Figure 3.4: WIC1-3

3.3 CTs for the WIC1

There are five different wide-range CTs for the protection system WIC1. Dependent on the rated primary power and voltage of the system, the following CTs can be offered:

CT Type	Rated CT current IS
WIC1-WE2	16 – 56 A
WIC1-W2	16 – 56 A
WIC1-W3	32 – 112 A
WIC1-W4	64 – 224 A
WIC1-W5	128 – 448 A
WIC1-W6	256 – 896 A

The protection relay can be set to the respective operating current of the switchboard by parameter Is. Reference on the calculation of the protective setting values resulting from this is made in chapter “Description of Application”.

Current transformer WIC1-WE2

In case of small values of the primary currents the user can choose for two current transformers with equal ratings but different characteristics of transmission –WE2 or W2.

It is typical reaction of self-powered protection relays such as WIC1 that there will be a non-linear transmission characteristic of the relay in case of small primary currents. This will effect on the accuracy of the whole system if the current transformer is a W2 type and primary current values are less than 20 A.

Generally less accuracy will be accepted for phase current protection so that the CT W2 represents an inexpensive solution.

If there will be required a higher accuracy or in case of an active earth current protection element it is re-commended to use a WE2 mixed core type CT based on MU metal. In the lower operation range this CT type is more precise than the ordinary W2 type.

4. Technical Data, Characteristics and Features

4.1 Protective functions

4.1.1 Minimal operating current and rated primary current

In order to operate reliably, the WIC1 - as all CT-powered protection relays - needs a minimal current flowing constantly in one of the phases. This minimal current is the smallest rated CT current (IS) x 0.9 listed in table.

The real rated current of the operating component to be protected is adjusted by parameter IS. All further settings at the protection relay refer to the adjusted IS. This is to be described in the following example;

Boundary condition:

Setting IS = 40 A, CT type W3, 32 to 112 A

Setting I>: $1.1 \times IS = 1.1 \times 40 \text{ A} = 44 \text{ A}$

Setting I>>: $10 \times IS = 10 \times 40 \text{ A} = 400 \text{ A}$

Setting IE>: $0.2 \times IS = 0.2 \times 40 \text{ A} = 8 \text{ A}$

Depending on the CT type, an adjustment for relay version WIC1-1 is possible in the following scaling:

CT Type	Rated CT current	Step
WIC1-WE2	16 – 56 A	0.2 A
WIC1-W2	16 – 56 A	0.2 A
WIC1-W3	32 – 112 A	0.4 A
WIC1-W4	64 – 224 A	0.8 A
WIC1-W5	128 – 448 A	1.6 A
WIC1-W6	256 – 896 A	3.2 A

Note: only for setting via serial interface

For relay versions WIC1-2 and WIC1-3 the following rated CT currents are adjustable either by DIP switches 1-4 (switch block 1) or HEX switch 1:

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
WIC1-W2	16	18	20	22	24	26	28	30	32	34	36	40	44	48	52	56
WIC1-W3	32	36	40	44	48	52	56	60	64	68	72	80	88	96	104	112
WIC1-W4	64	72	80	88	96	104	112	120	128	136	144	160	176	192	208	224
WIC1-W5	128	144	160	176	192	208	224	240	256	272	288	320	352	384	416	448
WIC1-W6	256	288	320	352	384	416	448	480	512	544	576	640	704	768	832	896

*Note: All values are primary values in Ampere

Table 4.1

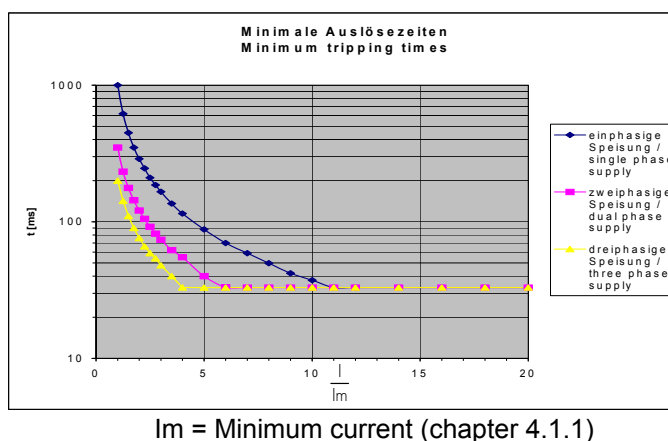
4.1.2 Phase time over current protection

The following setting ranges and gradings apply for the WIC1-1. Here the parameters can only be set via a serial interface.

Current	Arithmetic averages measurement
Threshold values	$I >$ 0.9 to 2.5 $\square$ I_S in steps of 0.05 x I_S when adjusting via interface $I >>$ 1 to 20 $\square$ I_S in steps of 0.1 x I_S when adjusting via interface
Tripping time for the definite time over current element	$tI >$ 0.04s to 300s in the following steps when adjusting via interface 0.04s - 1s in 0.01 s steps 1s - 5s in 0.1s steps 5s - 20s in 0.5s steps 20s - 100s in 2s steps 100s - 300s in 5s steps
IMT characteristics*:	Normal Inverse (N-INV) Very Inverse (V-INV) Extremely Inverse (E-INV) Long Time Inverse (L-INV) RI-Inverse (RI-INV) Fuse characteristic of a HV fuse Fuse characteristic of a full range fuse (FR-Fuse)
Time factor	0.05 to 10 in steps of 0.05 when adjusting via interface
Tripping times for the definite time short-circuit element	$tI >>$ 0.04s to 3s in the following steps when adjusting via interface 0.04s - 1s in 0.01 s steps 1s - 3s in 0.02 s steps

Note:

The min. tripping time when switched on to a failure is subject to the fault current level. See the following diagram. The diagram shows the tripping time under worst conditions like ageing, temperature.



With the WIC1 protection system minimal tripping times of 40 ms can be achieved.

Time correction	of current 0	$\leq 45\text{ms}$
	of current $> I_m$	$\geq 35\text{ms}$
Disengaging time	$< 30\text{ms}$	

* The starting point of the characteristic should be in the area of the rated CT current, e. g. $W2 = 16 - 56\text{ A}$. If over the parameter $I >$ the starting point is set higher, then the relay cuts the characteristics at 20 x upper rated current.

For relay versions WIC1-2 and WIC1-3 the adjustment of values is done according to the tables listed below:

Characteristic curve = HEX-Switch 2/DIP-Switch 1 (5 - 6)

DIP 1-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Characteristic	DEFT	N-INV	V-INV	E-INV	LI-INV	RI-INV	HV-Fuse	FR-Fuse	X	X	X	X	X	X	X	X

I> = HEX-Switch 3/DIP-Switch 2 (1 - 4)

DIP 2-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 2-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 2-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 2-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 3	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x Is	0.9	0.95	1	1.05	1.1	1.15	1.2	1.3	1.4	1.5	1.6	1.8	2	2.25	2.5	Exit

tl> = HEX-Switch 4/DIP-Switch 2 (5 - 8)

DIP 2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 2-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 2-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 2-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 4	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
time (s) *1	0.04	1	2	3	4	5	6	8	10	15	30	60	120	180	240	300
Time (s) *2	0.04	0.3	0.6	1	2	3	4	6	8	10	15	30	60	120	210	300
Factor "a"	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1	2	3	4	5	6	8	10

*1 The time setting table is valid for WIC1-2/3 up to device version no. G008

*2 The time setting table is valid for WIC1-2/3 onward from device version no. G009

I>> = HEX-Switch 5/DIP-Switch 3 (1 - 4)

DIP 3-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 3-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 3-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 3-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 5	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x Is	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	Exit

tl>> = HEX-Switch 6/DIP-Switch 3 (5 - 8)

DIP 3-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 3-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 3-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 3-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 6	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
time (s)	0,04	0,07	0,1	0,15	0,2	0,25	0,3	0,4	0,6	0,8	1,0	1,4	1,8	2,2	2,6	3,0

4.1.3 Earth current protection

Current $I_{E>}$ Internal calculated cumulative current formation
0.2 to 2.5 $\square$ IS in steps of 0.05 $\square$ IS
when adjusting via the interface for the WIC1-1

Tripping time $t_{IE>}$ 0.1s to 20s in steps of 0.01 when adjusting via
the interface for the WIC1-1

$I_{E>}$ = HEX-Switch 7/DIP-Switch 4 (1 - 4)

DIP 4-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 4-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 4-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 4-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 7	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x Is	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.5	Exit

$t_{IE>}$ = HEX-Switch 8/DIP-Switch 4 (5 – 8)

DIP 4-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 4-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 4-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 4-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 8	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
time (s)	0.1	0.2	0.4	0.6	0.8	1	1.5	2	2.5	3	3.5	4	6	8	10	20

4.2 Default Settings

All WIC1 relay versions are set in our works at the smallest possible setting values.

Is = smallest possible rated current (W2=16A, W3=32A, W4=64A, W5=128A, W6=256A)

Characteristic: Definite Time

$I_{>} = 0.9 \times I_n$

$t_{I>} = 0.04s$

$I_{>>} = 1.00 \times I_n$

$t_{I>>} = 0.04s$

$I_{E>} = 0.20 \times I_N$

$t_{IE>} = 0.10s$

4.3 Routine safety check

In case of misadjustment of the relay, e.g. selection of non-assigned switch positions, the relay operates with the following setting values.

I_S = upper rated CT current
 Characteristic = DEFT
 $I_{>}$ = Deactivated (Exit)
 $t_{I>}$ = 0.04 s
 $I_{>>}$ = $20 \times I_S$
 $t_{I>>}$ = 0.04 s
 With earth fault element
 $I_{E>}$ = $2.5 \times I_S$
 $t_{IE>}$ = 0.1 s

A circuitry is integrated to give an additional back-up protection in case of processor or storage errors. By this circuitry a short-circuit protection with the following trip values is guaranteed:

- $I_{>>}$ = 20 times highest rated CT current
- $t_{I>>}$ = 40 ms

The relay option WIC1-xxx-W works with an additional backup-protection when

- The watch-dog of the microcontroller responded,
- 0.8 times lowest rated CT current is flowing,
- the energy storage is charged (charging time is 1s at lower rated CT current),

4.4 Fault value memory

A fault value memory is integrated in the WIC1 where data of the latest fault occurrence is stored. The stored information can only be read out via the PC interface. The following fault references are available:

- the protective element causing the trip or an externally triggered trip
- values of the trip current in the individual phases or earth fault currents (with E type)

4.5 Communication

4.5.1 Communication via PC adapter

For connection to the RS 232 interface of a PC or Palm Top with integrated battery supply, an adapter WIC1-PC2 is needed. Through this adapter the galvanic isolation between protection device and PC/Palm Top is reached and it supplies the WIC1 with the necessary energy. For communication a proprietary SEG protocol is used.

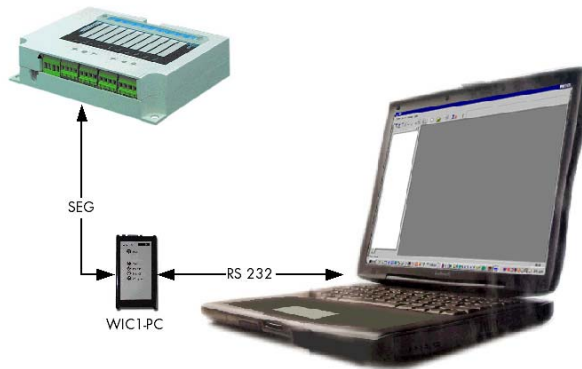


Figure 4.1: WIC1, WIC1-PC and Laptop

To connect the WIC1-PC to a serial interface, a 9-pole standard zero-modem-cable is needed. The lockable opening at the housing of WIC1 and the 6-pole plug are of matching design.

A 9V battery is integrated in the PC adapter. During reading out and writing of parameters the WIC1 is fed by the PC adapter

The battery charging level is indicated by LED on the PC adapter. As soon as the adapter is connected with the PC and the battery charging level is high enough, the LED lights up. Dropping of the battery voltage is indicated by LED.

The data exchange between PC/Palm Top and WIC1 is signaled by lighting up of the LED "Tx" and "Rx" resp. Transmit/Receive.

4.6 Inputs and outputs

The terminals for connection of the CT, the tripping coil of the external trip input as well as the flag indicator output are provided at the left side of the WIC1. Dependent on the relay type either screw-type terminals or screw-type plug-in terminals in 4-block arrangement are used. Make of both terminal types is Phönix.

A cover serves as protection against accidental contact and prevents unintended loosening of the plug in terminal connections. Terminal marking is durable embossed in the housing.

4.6.1 Remote trip input

To the four terminals of the top terminal block 230V~; 115V~; 0V~ and PE the relevant aux. voltage for the remote trip input is connected. This input is electrically isolated and can be loaded continuously.

Terminal PE is the central earthing point for the protective system.

Technical Data:

Input voltage range: 230 V $\pm$ 15%
 115 V $\pm$ 15%

Tripping delay: $\leq$ 1 s

4.6.2 Impulse output for the tripping coil

The energy-low tripping coil of the circuit breaker is connected to terminals TC+ and TC- of the second terminal block. The trip energy is provided by a capacitor store integrated in the protection relay. Length of the trip impulse is 50ms; the pause between the individual pulses depends on the impedance of the tripping coil and the current level. Pulsing is continued until the activation threshold is undershot.

Technical Data:

Trip energy: $E \geq 0.1$ Ws
Voltage: ≥ 24 V DC

4.6.3 Earthing

The fourth terminal (PE) of the top terminal block is the central earth connection point of the protection system.

4.6.4 Impulse output for the relay

The energy-low tripping coil of the circuit breaker is connected to terminals FI+ and FI-- of the second terminal block. The trip energy is provided by a capacitor store integrated in the protection relay. Length of the trip impulse is 50ms; the pause between the individual pulses depends on the impedance of the flag indicator and the current level. Pulsing is continued until the activation threshold is undershot.

Technical Data:

Energy: $E \geq 0.01$ Ws
Voltage: ≥ 24 V DC

4.6.5 Measuring inputs for the CTs

The measuring inputs of the WIC1 protection system are matching the allocated CTs. Also the power requirement of the relay and the CT output power match.

The connection of common CTs with secondary currents of 1 A or 5 A is inadmissible!

4.7 Technical Data

4.7.1 Common Data

Frequency:	45 Hz to 65 Hz
Nominal:	50/60 Hz
Thermal load capacity:	Permanently: 2.5 x highest rated CT current
	1s 25 kA CT primary current
	3s 20 kA CT primary current
Dynamic load capacity:	62.5 kA CT primary current
Disengaging ratio:	95% of the pick up value

4.7.2 Temperature Range

Temperature range when stored:	-40°C to +85°C
Temperature range when in operation:	-40°C to +85°C

4.7.3 Accuracy

Tripping times:	DMT: $\pm 1\%$ of the setting value absolutely ± 10 ms IMT: dependent on the current level and chosen characteristic, absolutely ± 10 ms
Earth fault element:	$\leq 5\%$ of the setting value in the range of $IE > I_S$ $\leq 5\%$ of the I_S in the range of $IE > I_S$
Measuring accuracy for: CT WE2, W3, W4, W5	$\leq 5\%$ in the temperature range 0°C to +50°C $\leq 7.5\%$ in the temperature range -40°C to +85°C
Measuring accuracy for CT W2:	at 0°C to +50°C $\leq 12.5\%$ at 14.4 A $\leq 7.5\%$ at 20 A $\leq 5\%$ at 28.8 A at -40°C to +85°C $\leq 15\%$ at 14.4 A $\leq 10\%$ at 20 A $\leq 7.5\%$ at 28.8 A

The accuracies apply to all CT types available from the smallest adjustable primary currents up to a primary current of 20 x the highest rated CT current selectable.

CT Type	Applying Accuracy Measuring Range
WIC1-WE2	14.4 – 1152 A
WIC1-W2	14.4 – 1152 A
WIC1-W3	28.8 – 2304 A
WIC1-W4	57.6 – 4608 A
WIC1-W5	115.2 – 9216 A
WIC1-W6	230.4 – 18432 A

4.7.4 Insulation voltage withstand

Test of withstand alternating voltage for 1 min:	IEC 60255-5	2.5 kV
Test of lightning surge voltage 1.2/50 μ s, 0.5 J	IEC 60255-5	5 kV

4.7.5 EMC

Interference immunity against discharges of static electricity

DIN EN 60255-22-2 [05/97]	Air discharge	8 kV
DIN EN 61000-4-2 [03/96]	contact discharge	6 kV
Class 3		

Interference immunity against high-speed transient interference quantities

DIN IEC 60255-22-4 [10/93]	power supply, mains inputs	± 4 kV, 2.5 kHz
DIN EN 61000-4-4 [03/96]	other inputs and outputs	± 2 kV, 5 kHz
Class 4		

Interference immunity against 1 MHz burst disturbance tests

DIN EN 60255-22-6 [11/94]	differential mode	2.5 kV, 1 MHz
DIN IEC 60255-22-1 [05/91]	common mode	1 kV, 2 s

Interference immunity against surge immunity test

DIN EN 61000-6-2 [03/00]		4 kV/2 kV
DIN EN 61000-4-5 [09/96]		

Interference immunity against high-frequent electromagnetic fields

DIN EN 61000-4-3 [08/97]		10 V/m
Class 3		

Interference immunity against magnetic fields of energy based frequency

DIN EN 61000-4-8 [05/94]	continuously	100 A/m
Class 5	3 s	1000 A/m

Interference immunity against line conducted interference quantities induced by high-frequent fields

DIN EN 61000-4-6 [04/97]		10 V/m
Class 3 (0.15-230 MHz)		

Interference immunity against surge voltage

DIN EN 61000-4-5 [09/96]	within a current circuit	2 kV
Class 4	current circuit to earth	4 kV

Measuring of the radio interference voltage

DIN EN 55011 [10/97]		Limit. value class B
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Measuring of the radio interference radiation

DIN EN 55011 [10/97]		Limit. value class B
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4.7.6 Ambient conditions

Vibration and continuous vibration test

DIN EN 60255-21-1 [05/96]

Class 2

1/2 gn

Shock and continuous shock test

DIN EN 60255-21-2 [05/96]

Class 2

10/20 gn

Earthquake test

DIN EN 60255-21-3 [11/95]

Class 2

2 gn

Classification

DIN EN 60068-1 [03/95]

Climate category

40/085/56

Test Ad: Cold

DIN EN 60068-2-1 [03/95]

Temperature

-40°C

Period of stress

16 h

Test Bd: Dry heat

DIN EN 60068-2-2 [08/94]

Temperature

+85°C

Rel. humidity

<50%

Period of stress

72 h

Test Ca: Humid heat (constantly)

DIN IEC 60068-2-3 [12/86]

Temperature

+40°C

Rel. humidity

93%

Period of stress

56 h

Test Db :Humid heat (cyclic)

DIN IEC 60068-2-30 [09/86]

Temperature

+85°C

Rel. humidity

95%

Cyclen (12 + 12-hours)

2

Class of protection

Relay housing

IP 40

Electronics

IP 65

Terminals

IP 20

4.7.7 Outside dimension of CTs

The structural forms of the CTs depend on the switchboard construction, i.e. they are in compliance with specific customer needs. We have various standard designs. For further information please contact your sales partner.

Note

The current transformers shown below are dimensioned for nominal voltages <1000 V. This means, for application in MV-switchboards <36 kV these current transformers may only be used with insulated primary conductors for example cables with appropriate insulation resistance against earth. These current transformers are not allowed to be used for non-insulated primary conductors > 1000 V against earth.

Type: WIC1-WxAS1

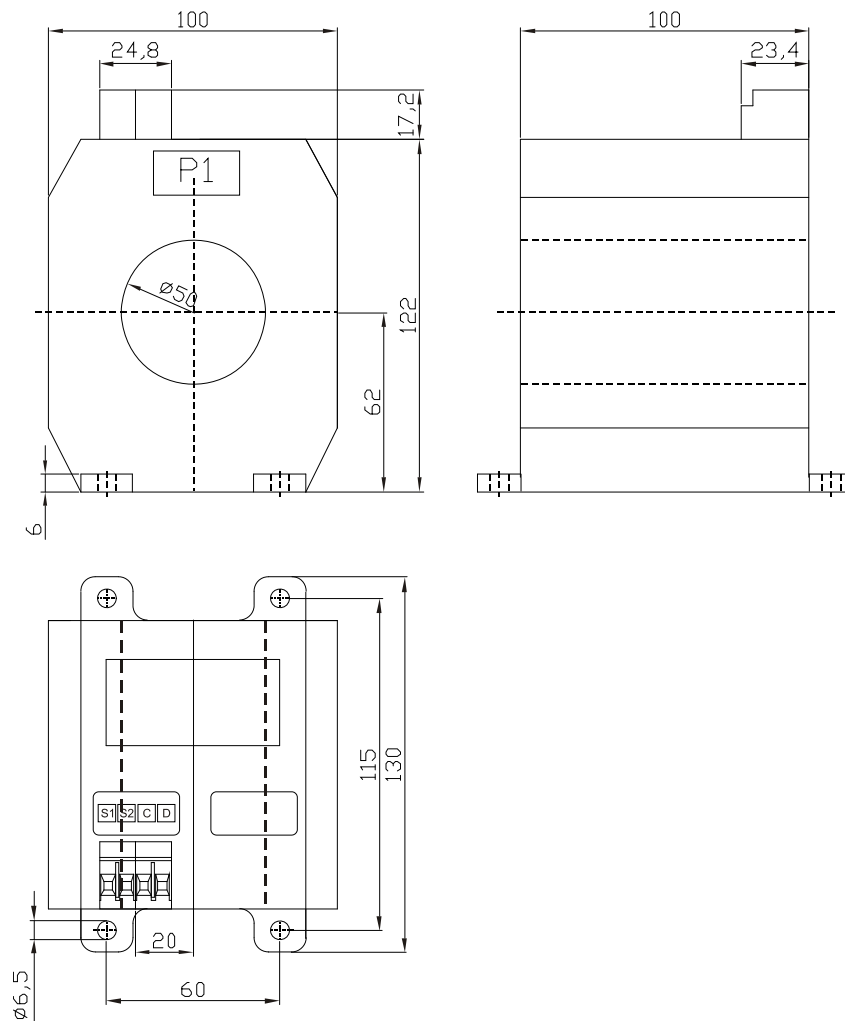


Figure 4.2: Type WIC1-W2AS1 – WIC1-W5AS1 as panel mounting

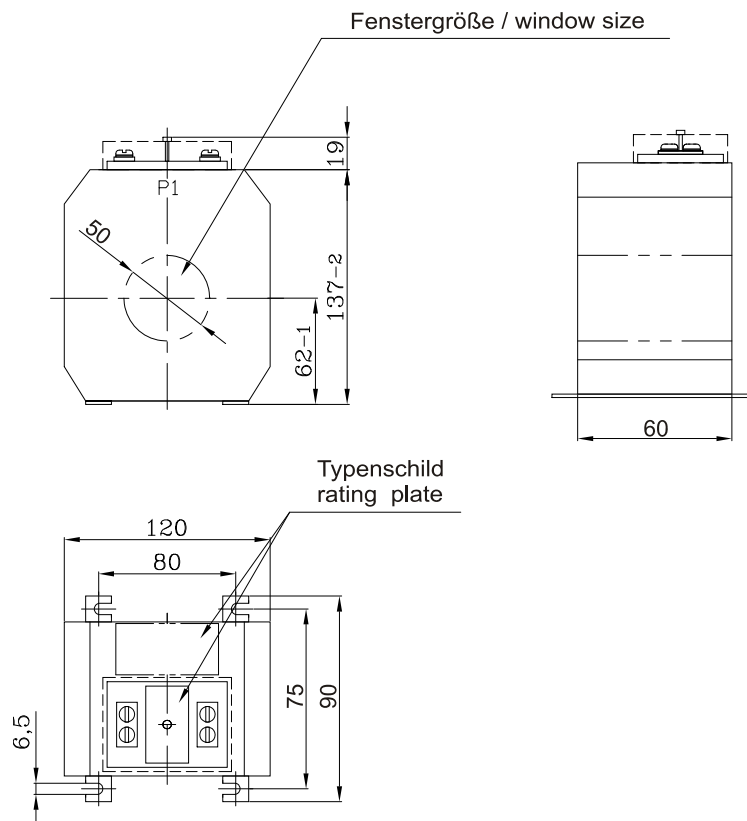
Type: WIC1-W6AS1

Figure 4.3: Type WIC1-W6AS1 as panel mounting

4.8 Characteristics and times

4.8.1 Characteristic curves

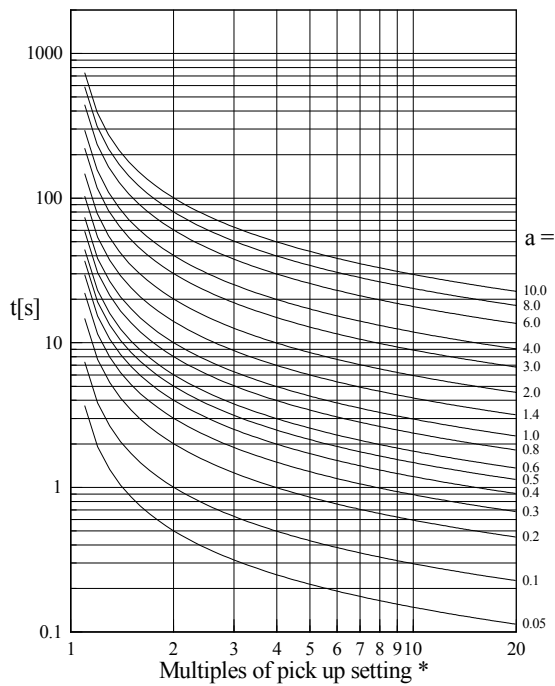


Figure 4.4: Normal Inverse

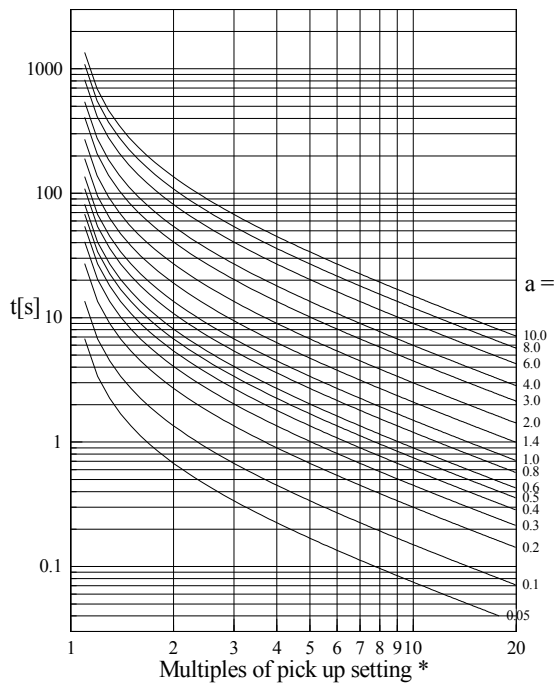


Figure 4.5: Very Inverse

*Multiples of pick up setting =

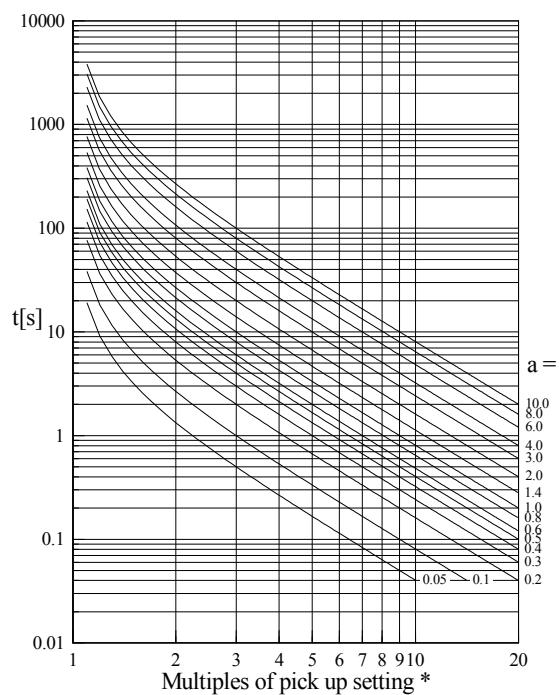


Figure 4.6: Extremely Inverse

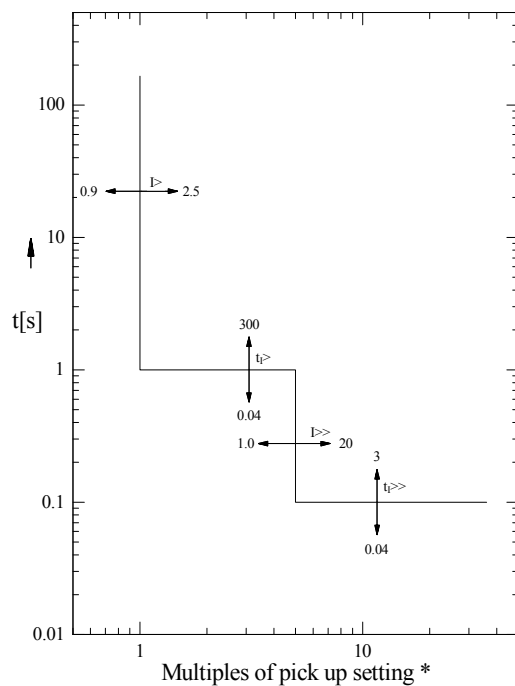


Figure 4.7: Definite Time

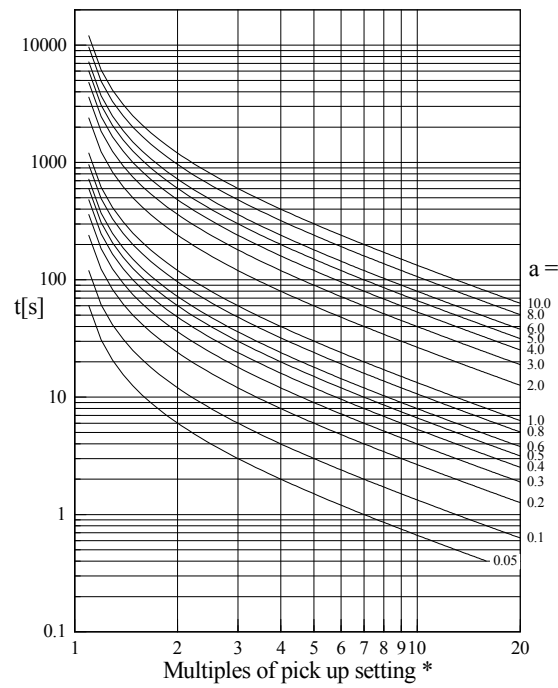


Figure 4.8: Long time inverse

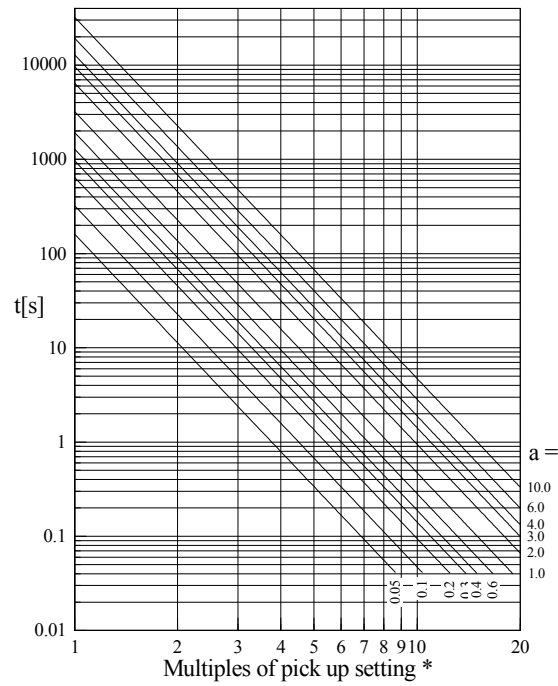


Figure 4.9: HV-fuse

*Multiples of pick up setting =

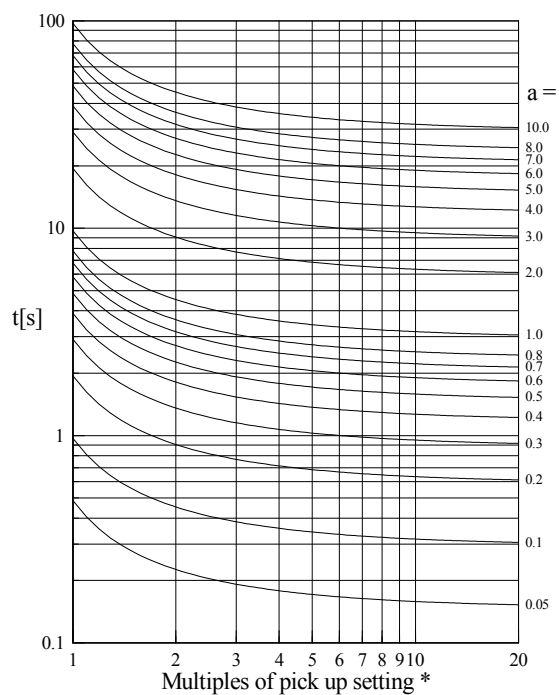


Figure 4.10: RI-Inverse

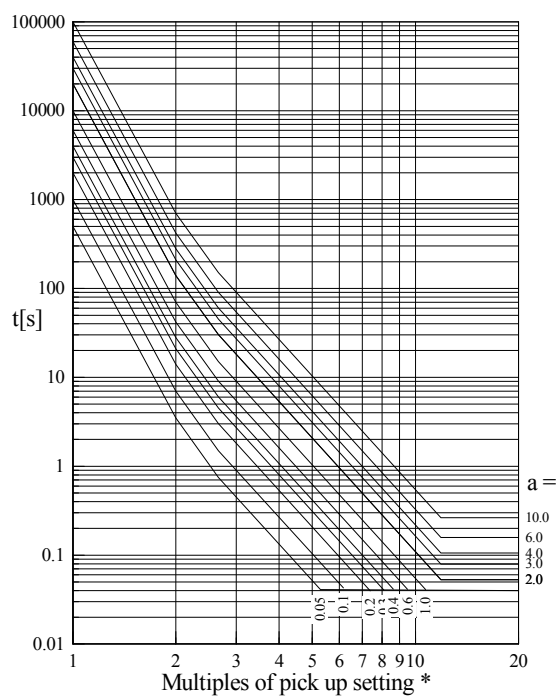


Figure 4.11: FR-fuse

4.8.2 Calculation formula for IMT characteristics

Normal Inverse:

$$t = \frac{0.14}{\left(\frac{I}{I_S \times I_{>}}\right)^{0.02} - 1} \cdot a[s]$$

Very Inverse:

$$t = \frac{13.5}{\left(\frac{I}{I_S \times I_{>}}\right) - 1} \cdot a[s]$$

Extremely Inverse:

$$t = \frac{80}{\left(\frac{I}{I_S \times I_{>}}\right)^2 - 1} \cdot a[s]$$

Long time inverse:

$$t = \frac{120}{\left(\frac{I}{I_S \times I_{>}}\right) - 1} \cdot a[s]$$

RI-Inverse Time:

$$t = \frac{1}{0.339 - \frac{0.236}{\left(\frac{I}{I_S \times I_{>}}\right)}} \cdot a[s]$$

HV-Fuse:

$$t = 10^{\left(\log\left(2 \cdot \frac{I}{I_S \times I_{>}}\right) \cdot (-3.832) + 3.66\right)} \cdot \frac{a}{0.1} [s]$$

FR-Fuse

$$\frac{I}{I_S \times I_{>}} = 1 - 2 \rightarrow t = 10^{\left(\log\left(\frac{I}{I_S \times I_{>}}\right) \cdot (-7.16) + 3.0\right)} \cdot \left(\frac{a}{0.1}\right) (s)$$

$$\frac{I}{I_S \times I_{>}} = 1 - 2.66 \rightarrow t = 10^{\left(\log\left(\frac{I}{I_S \times I_{>}}\right) \cdot (-5.4) + 2.47\right)} \cdot \left(\frac{a}{0.1}\right) (s)$$

$$\frac{I}{I_S \times I_{>}} > 2.66 \rightarrow t = 10^{\left(\log\left(\frac{I}{I_S \times I_{>}}\right) \cdot (-4.24) + 1.98\right)} \cdot \left(\frac{a}{0.1}\right) (s)$$

4.8.3 Flag Indicators

WI1-SZ4

Technical Data

Coil: 24V DC $\pm$ 10%

- can be set electrically
- can be reset mechanically

Connector assignment

Coil connection	Core color	mm ²	Function
	black	0.25	Gnd/Set
	black	0.25	Gnd/Set

Cable connection length: 1m

WI1-SZ5:

Technical Data

Coil: 24V DC $\pm$ 10%
 Contact rating 230V AC/3A
 230V DC/0.12A
 115V DC/0.2A
 24V DC/2A

- Flag indicator with two potential free contacts
- can be set and reset electrically
- can be reset mechanically

Connector assignment:

Coil connection	Core color	mm ²	Function
	brown	0.25	(-) Gnd
	violet	0.25	(+) Set
	orange	0.25	(+) Reset
changeover contact 1	white	0.50	NO contact
	yellow	0.50	changeover contact
	green	0.50	NC contact
changeover contact 2	black	0.50	NO contact
	blue	0.50	changeover contact
	red	0.50	NC contact

Cable connection length: 1m

4.8.4 Description of application

4.9 Foreword

As CT-powered protection relay the WIC1 is mainly used in MV switchboards with circuit breakers, protecting distribution transformers in local and industrial networks. Due to its small size the WIC1 is very well suited for the use in compact switchboards.

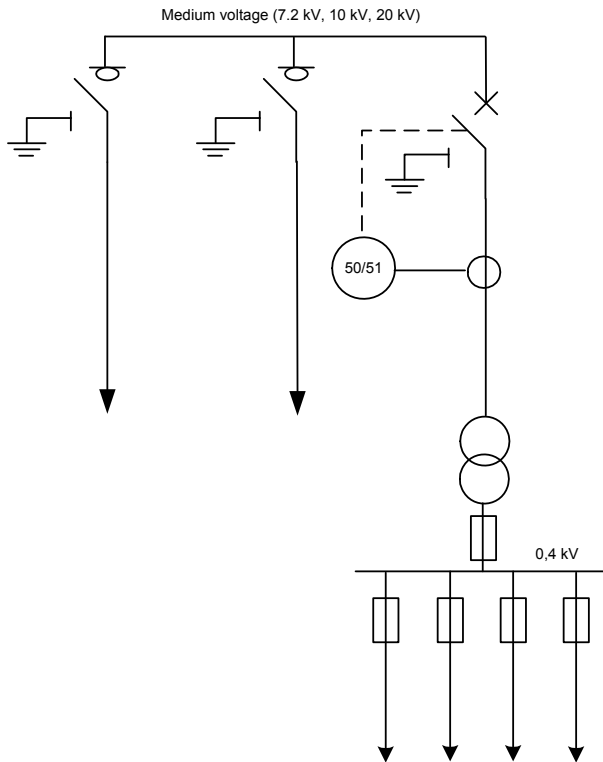


Figure 4.12: Basic circuit diagram of a standard switchboard with 2 feeders and 1 outgoing transformer panel

The ability of the protection system WIC1 to adapt to different primary currents makes it possible that it is used for all standard rated transformer loads and the different MV operational voltages.

4.10 Selection of the CT transformation voltage ratio

Selection of the CT suitable for the WIC1 depends on the rated current of the transformer to be protected and is calculated acc. to the following formula:

Example:

SN = 1600 kVA

UN = 10 kV

-> $I_N = 92.5 \text{ A}$

CTs WIC1-W3 and WIC1-4 are suitable for this rated current.

Marginal conditions, which should be regarded additionally with the selection of the CT's.

1. Short-circuit transient characteristic
The WIC1 can measure a short-circuit current of a circuit up to 20 times of the upper rated CT current. This means for the CT selected above, W3: $112 \text{ A} \cdot 20 = 2240 \text{ A}$ or , W4: $224 \text{ A} \cdot 20 = 4480 \text{ A}$. If the short-circuit current of a circuit is approx. 3 kA, for example, because of the location, then the preference should be given to the W4 CT, so that the current can be measured cleanly by the WIC1.
2. Operating current.
Furthermore please pay attention to the operating current of the protection object. The operating current should be in the rated CT current range. The WIC1 system can be loaded continuously up to 2.5 times of the upper rated CT current. This has no effect on the measurement of the overload. But due to the limitation of the measurement to 20 times the upper rated CT current, the short-circuit protection is limited.

With parameter Is the calculated rated current is preset in the protection relay.

According to table 4.1 IS currents of 88A can be adjusted for both CT types in relay versions WIC1-2 and WIC1-3.

In the example shown below, the transformer can be operated with 1.1 times the rated current for 10s. The setting value for I> is calculated as follows:

WIC1-1:

$I_{>} = 1.1 \times I_s$ with $I_s = 92.5 \text{ A}$

WIC1-2 and WIC1-3:

$$I_{>} = \frac{1.1 \cdot I_{NT}}{I_s} = \frac{1.1 \cdot 92.5 \text{ A}}{88 \text{ A}} = 1.16 \cdot I_s$$

By means of the switches, however, only $1.15 \times I_s$ or $1.2 \times I_s$ can be set for parameter I>. Therefore it is up to the user to choose either $1.15 \times I_s$ or $1.2 \times I_s$

The different rated primary currents of all standard transformer sizes at various rated mains voltages are compiled in chapter 7.2.

4.11 Adjustment instruction for inverse characteristic

In the introduction phase of the WIC1 it came to understanding problems during the adjustment of the protection relay, in particular when using inverse characteristics. In the following now the connections are for this described.

Notion definition:

I_s = Setting value of the load current

With the parameter I_s the operating current of the protected equipment is set. Due to the application of wide range CT's the use of only one CT for a wide primary current range is applicable. All further setting parameter are related to the parameter I_s .

$I_{>}$ = Pick up value of the over current element

With this parameter the pick up value of the over current element is set. Here for it is to distinguish between the use of an defined time characteristic or inverse time characteristic.

At the use of a defined time characteristic the parameter $I_{>}$ specified the pick up value of the over-current element. Exceed the measured current the factor $I_s \square I_{>}$ the WIC1 will pick up.

At the use of a inverse time characteristic the parameter $I_{>}$ specified the starting point of the characteristic curve. Means, that the factor $I_s \square I_{>}$ is the starting point of the characteristic curve at one times of .

$t_{I>} =$ Delay time of the over current element by use of DEFT

$a =$ Time multiplier of the characteristic curve by the use of INV

This parameter serve to delay the trip of the WIC1 after a pick up occurs. By the use of a defined time characteristic the WIC1 trips when the pick up still exist at the time elapsed.

By the use of a inverse characteristic the factor a shift the characteristic curve (see diagram).

$I_{>>}$ = Pick up value of the short circuit element

With this parameter the pick up value of the short current element is set. Exceed the measured current the factor $I_s \square I_{>>}$ the WIC1 will pick up.

$t_{I>>} =$ Tripping time of the short circuit element

This parameter serve to delay the trip of the WIC1 after a pick up occurs. The WIC1 trips when the pick up still exist at the time elapsed.

$I_{E>}$ = Pick up value of the earth fault element

With this parameter the pick up value of the earth fault element is set. Exceed the measured current the factor $I_s \square I_{E>}$ the WIC1 will pick up.

$t_{I_{E>}} =$ Tripping time of the earth fault element

This parameter serve to delay the trip of the WIC1 after a pick up occurs. The WIC1 trips when the pick up still exist at the time elapsed.

Estimation of the tripping time at inverse characteristics

The setting and estimation by the use of an inverse characteristic will be explained at the following example.

Boundary condition:

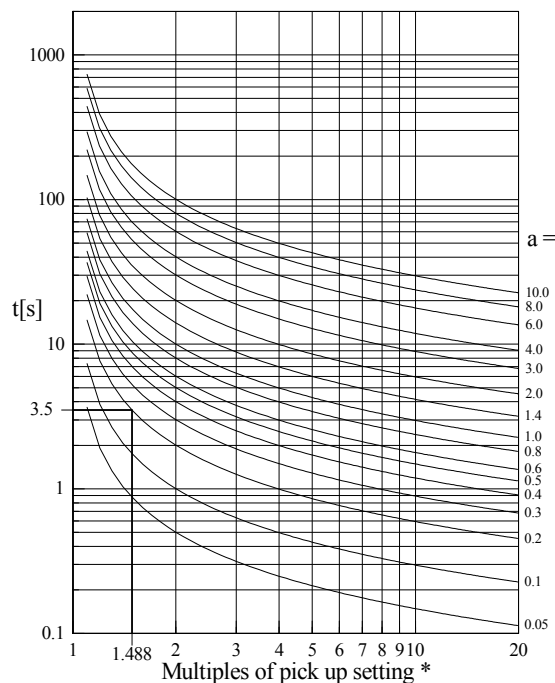
Operating current of the load (IS)	72A
Selected CT ratio	WIC1-W3, 32 A – 112 A
Characteristic	Normal Inverse N-INV
Starting point of the characteristic	$I > \times I_S$
Over current ($I >$):	1.4
Factor „a“ ($tI >$)	0.2
Short current ($I >>$)	1 kA
Delay time for $I >>$	100 ms
Primary test current value	150 A

Setting of the WIC1:

$I_S = 72 \text{ A}$
 $I > = 1.4$
 $\text{„a“ } (tI >) = 0.2$
 $I >> = 14 \text{ (1kA/72A = 13.88)}$
 $tI >> = 0.1 \text{ s}$

Estimation of the tripping time from the characteristic curve

Starting point of the curve = $1.4 \times 72 \text{ A} = 100.8 \text{ A}$, this correspond to = $1 \times I/I_S \times I >$.
 Primary testing current = 150 A, here for a factor as follows is calculated $I/I_S \times I > = 150 \text{ A}/100.8 \text{ A} = 1.488$



*Multiples of pick up setting =

From the curve a tripping time of 3.5s is estimated.

5. Commissioning and Maintenance

5.1.1 Important note

Putting into operation and the relevant tests should only be carried out by skilled personnel. We do not accept any liability for damage caused by improper handling of the protection system, or of the primary side of the equipment. Pay attention to check that over the primary circuit no second current flow way is possible. (Grounding of the feeder).

5.2 Accessories for commissioning work

For commissioning of the protection system the following accessories should be available:

- For WIC1-1 a –WIC1-PC adapter and a PC or Palm Top with software
- Secondary testing system (see chapter 5.3ff)
- Screwdriver; cross slot type, size 1; 3mm slot
- Setting parameters

5.3 Criteria to be taken into account for protection devices fed by CT's

With this kind of current supply it has to be taken into account that the CT has to feed more power than this is the case for protection devices with an additional aux. voltage source. Furthermore it has to be noted that – with reference to the entire measuring range of the protection devices – the input impedance of the individual phases is not linear. The necessary power for testing the WIC1 is shown on the following graphs.

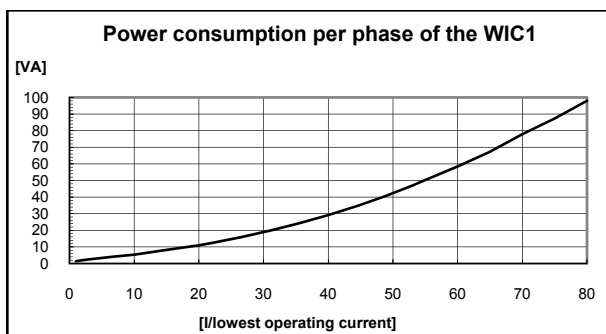


Figure 5.1: Power consumption of one phase over the entire measuring range of the WIC1

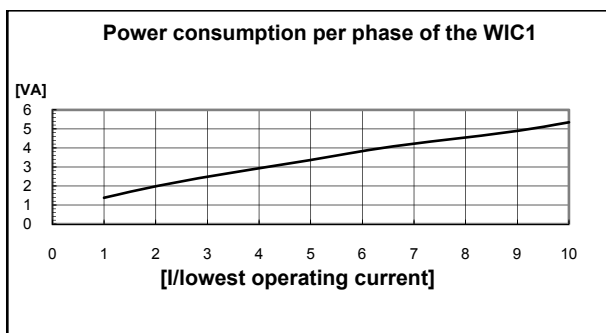


Figure 5.2: Power absorbed by one phase over the range 0.1 – 10 lowest operating current

Lowest operating current = lower rated current x 0,9. The operating current is chosen by $I_s * I >$.

WIC1-W2xx: 14.4 A ($I_s = 16$ A)
 WIC1-W3xx: 28.8 A ($I_s = 32$ A)
 WIC1-W4xx: 57.6 A ($I_s = 64$ A)
 WIC1-W5xx: 115.2 A ($I_s = 128$)
 WIC1-W6xx: 230.4 A ($I_s = 256$ A)
 I_s = lowest rated current

5.4 Special features for the WIC1 test

The WIC1 receives its supply energy out of the measuring circuit. Conditional on the circuit logic the WIC1 changes its measuring load in a cyclic way and that in an 1kHz cycle. This can have an effect on the feeding source.

5.5 Selection of the secondary test system

When selecting the secondary test system the following particulars should be taken into account.

- Secondary test system to be used as power source.
- Three phases for the earth current test, one phase for the phase current test (see chapter 5.8).
- Sufficient output power for the switching points to be tested (see fig. 5.1 and 5.2).
- The highest possible test current for testing via the test winding is at 22.4amps. A test system with an output current up to 10amps should be enough.
- A timer for measuring the time 0 – 300s. The time signal can be measured via the WIC1 outputs TC+/TC- or FI+/FI- as positive edge of a 24V signal.

5.6 Checks during commissioning

When putting into operation, the wiring and setting of the protection relay should be checked. Here the person doing the commissioning work is assisted by the integrated test windings of the WIC1 protection system, which are on the front of the relay. Hence any wiring jobs as well as actions in the cable connection area can be disregarded.

5.6.1 Wiring checks

Wiring has to be checked with the circuitry shown in the diagram below.

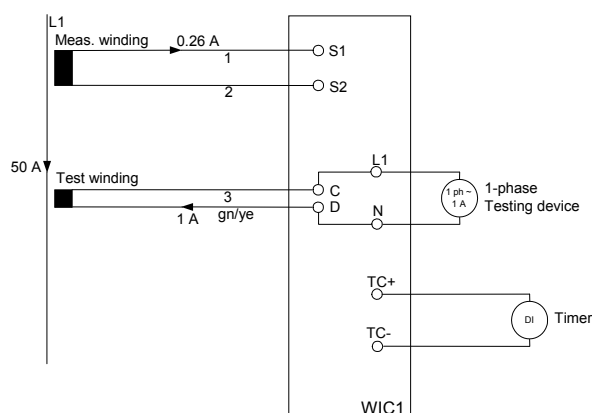


Figure 5.3: Connection of a single-phase testing device (phase L1) with CT WIC1-W2

The testing current is fed via sockets L1, L2, L3 and N. The test winding is rated such that the fed current of 1A balances a primary current of 50A (CT type WIC1-W2). The timer should be connect parallel to the tripping coil or the flag indicator. If there is no tripping coil or flag indicator available when the test is performed, an input resistor should be connected to the timer. The resistance of a timer should be in the range of 20 Ω up to 1 k Ω . This prevents false measurements when tests are repeated in short intervals because the energy store cannot be discharged.

5.6.2 WIC1 adjustment

The protection parameters are to be adjusted according to chapter 4 of this instruction. The set parameters can be registered directly on the sticker affixed on the relay.

5.7 Functional Test

There are two methods to carry out the tests: Primary test and secondary test.

When the primary test method is used, the test current is impressed via the primary winding.

When the secondary test method is used, the test current is impressed via the CD test winding. There are four different standard CT types available for the WIC1.

CT Type	Induced Current	Primary Current	Transformation Ratio
WIC1-WE2	1A	50A	50:1
WIC1-W2	1A	50A	50:1
WIC1-W3	1A	100A	100:1
WIC1-W4	1A	200A	200:1
WIC1-W5	1A	400A	400:1
WIC1-W6	1A	800A	800:1

5.7.1 Test Currents

The transformation ratio of primary currents to secondary currents of the CTs are equally proportionate as the test current via the CD winding to the secondary current. This means, no matter which CT type is in operation, for the secondary test always the same test values are used.

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX-Schalter I _s	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
WIC1-W2	16	18	20	22	24	26	28	30	32	34	36	40	44	48	52	56
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12
WIC1-W3	32	36	40	44	48	52	56	60	64	68	72	80	88	96	104	112
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12
WIC1-W4	64	72	80	88	96	104	112	120	128	136	144	160	176	192	208	224
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12
WIC1-W5	128	144	160	176	192	208	224	240	256	272	288	320	352	384	416	448
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12
WIC1-W6	256	288	320	352	384	416	448	480	512	544	576	640	704	768	832	896
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12

Table 5.1: Test values via CD winding with the different CT types

This means when I_s is multiplied with the setting value of the relevant protection element of I>, I>> or IE> it equals the test current via the test winding. The CT type is of no consequence. The following tables show all setting values for the protection steps I>, I>> and IE>.

5.7.2 Switching points for the overcurrent steps

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX-Schalter I>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Einstellwert I>	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.30	1.40	1.50	1.60	1.80	2.00	2.25	2.50	EXIT
I _s = Hex „0“	0.288	0.304	0.320	0.336	0.352	0.368	0.384	0.416	0.448	0.480	0.512	0.576	0.640	0.720	0.800	-
I _s = Hex „1“	0.324	0.342	0.360	0.378	0.396	0.414	0.432	0.468	0.504	0.540	0.576	0.648	0.720	0.810	0.900	-
I _s = Hex „2“	0.360	0.380	0.400	0.420	0.440	0.460	0.480	0.520	0.560	0.600	0.640	0.720	0.800	0.900	1.000	-
I _s = Hex „3“	0.396	0.418	0.440	0.462	0.484	0.506	0.528	0.572	0.616	0.660	0.704	0.792	0.880	0.990	1.100	-
I _s = Hex „4“	0.432	0.456	0.480	0.504	0.528	0.552	0.576	0.624	0.672	0.720	0.768	0.864	0.960	1.080	1.200	-
I _s = Hex „5“	0.468	0.494	0.520	0.546	0.572	0.598	0.624	0.676	0.728	0.780	0.832	0.936	1.040	1.170	1.300	-
I _s = Hex „6“	0.504	0.532	0.560	0.588	0.616	0.644	0.672	0.728	0.784	0.840	0.896	1.008	1.120	1.260	1.400	-
I _s = Hex „7“	0.540	0.570	0.600	0.630	0.660	0.690	0.720	0.780	0.840	0.900	0.960	1.080	1.200	1.350	1.500	-
I _s = Hex „8“	0.576	0.608	0.640	0.672	0.704	0.736	0.768	0.832	0.896	0.960	1.024	1.152	1.280	1.440	1.600	-
I _s = Hex „9“	0.612	0.646	0.680	0.714	0.748	0.782	0.816	0.884	0.952	1.020	1.088	1.224	1.360	1.530	1.700	-
I _s = Hex „A“	0.648	0.684	0.720	0.756	0.792	0.828	0.864	0.936	1.008	1.080	1.152	1.296	1.440	1.620	1.800	-
I _s = Hex „B“	0.720	0.760	0.800	0.840	0.880	0.920	0.960	1.040	1.120	1.200	1.280	1.440	1.600	1.800	2.000	-
I _s = Hex „C“	0.792	0.836	0.880	0.924	0.968	1.012	1.056	1.144	1.232	1.320	1.408	1.584	1.760	1.980	2.200	-
I _s = Hex „D“	0.864	0.912	0.960	1.008	1.056	1.104	1.152	1.248	1.344	1.440	1.536	1.728	1.920	2.160	2.400	-
I _s = Hex „E“	0.936	0.988	1.040	1.092	1.144	1.196	1.248	1.352	1.456	1.560	1.664	1.872	2.080	2.340	2.600	-
I _s = Hex „F“	1.008	1.064	1.120	1.176	1.232	1.288	1.344	1.456	1.568	1.680	1.792	2.016	2.240	2.520	2.800	-

Table 5.2: Test current via CD winding with the I> step and the different I_s setting values

5.7.3 Switching points for the short-circuit step

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX-Schalter I>>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Einstellwert xls	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	EXIT
Is = Hex „0“	0.32	0.64	0.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20	3.84	4.48	5.12	5.76	6.40	-
Is = Hex „1“	0.36	0.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60	4.32	5.04	5.76	6.48	7.20	-
Is = Hex „2“	0.40	0.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.80	5.60	6.40	7.20	8.00	-
Is = Hex „3“	0.44	0.88	1.32	1.76	2.20	2.64	3.08	3.52	3.96	4.40	5.28	6.16	7.04	7.92	8.80	-
Is = Hex „4“	0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80	5.76	6.72	7.68	8.64	9.60	-
Is = Hex „5“	0.52	1.04	1.56	2.08	2.60	3.12	3.64	4.16	4.68	5.20	6.24	7.28	8.32	9.36	10.40	-
Is = Hex „6“	0.56	1.12	1.68	2.24	2.80	3.36	3.92	4.48	5.04	5.60	6.72	7.84	8.96	10.08	11.20	-
Is = Hex „7“	0.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80	5.40	6.00	7.20	8.40	9.60	10.80	12.00	-
Is = Hex „8“	0.64	1.28	1.92	2.56	3.20	3.84	4.48	5.12	5.76	6.40	7.68	8.96	10.24	11.52	12.80	-
Is = Hex „9“	0.68	1.36	2.04	2.72	3.40	4.08	4.76	5.44	6.12	6.80	8.16	9.52	10.88	12.24	13.60	-
Is = Hex „A“	0.72	1.44	2.16	2.88	3.60	4.32	5.04	5.76	6.48	7.20	8.64	10.08	11.52	12.96	14.40	-
Is = Hex „B“	0.80	1.60	2.40	3.20	4.00	4.80	5.60	6.40	7.20	8.00	9.60	11.20	12.80	14.40	16.00	-
Is = Hex „C“	0.88	1.76	2.64	3.52	4.40	5.28	6.16	7.04	7.92	8.80	10.56	12.32	14.08	15.84	17.60	-
Is = Hex „D“	0.96	1.92	2.88	3.84	4.80	5.76	6.72	7.68	8.64	9.60	11.52	13.44	15.36	17.28	19.20	-
Is = Hex „E“	1.04	2.08	3.12	4.16	5.20	6.24	7.28	8.32	9.36	10.40	12.48	14.56	16.64	18.72	20.80	-
Is = Hex „F“	1.12	2.24	3.36	4.48	5.60	6.72	7.84	8.96	10.08	11.20	13.44	15.68	17.92	20.16	22.40	-

Table 5.3: Test current via CD winding with the I>> step and the different Is setting values

5.8 Special features for earth current tests

Functional description:

In the WIC1 the earth current is calculated and cannot be measured. It is established from the geometrical amount of the three phase current values, more or less a numerical Holmgreen. If, for instant, a single-phase test current is impressed, the measuring value (tripping value) in the earth current path equals the current in the tested phase. If, with a phase shift of 120° a three-phase test current is impressed, the measuring value in the earth current path equals zero.

Requirement on the test system:

The WIC1 is powered by the instrument transformer. In order to guarantee reliable tripping a minimal current of 0.9 x lowest nominal CT current (0.9 x lowest I> setting) has to flow in one of the phases. If the setting of the earth current IE> is lower than the smallest possible switching point for the phase current, then the switching point for earth current tripping can only be tested by a three-phase power source. In case the set switching point for earth current is higher than the smallest possible switching point for overcurrent tripping (Is x I>, then the test can be performed with a single-phase power source.

5.8.1 Switching points for the earth current step

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX-Schalter IE>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Einstellwert IE>	0.2*	0.3*	0.4*	0.5*	0.6*	0.7*	0.8*	0.9	1	1.2	1.4	1.6	1.8	2.0	2.5	EXIT
Is = Hex „0“	0,064															
	0,096	0,128	0,160	0,192	0,224	0,256	0,288	0,320	0,384	0,448	0,512	0,576	0,640	0,800	-	
Is = Hex „1“	0,072	0,108	0,144	0,180	0,216	0,252	0,288	0,324	0,360	0,432	0,504	0,576	0,648	0,720	0,900	-
Is = Hex „2“	0,080	0,120	0,160	0,200	0,240	0,280	0,320	0,360	0,400	0,480	0,560	0,640	0,720	0,800	1,000	-
Is = Hex „3“	0,088	0,132	0,176	0,220	0,264	0,308	0,352	0,396	0,440	0,528	0,616	0,704	0,792	0,880	1,100	-
Is = Hex „4“	0,096	0,144	0,192	0,240	0,288	0,336	0,384	0,432	0,480	0,576	0,672	0,768	0,864	0,960	1,200	-
Is = Hex „5“	0,104	0,156	0,208	0,260	0,312	0,364	0,416	0,468	0,520	0,624	0,728	0,832	0,936	1,040	1,300	-
Is = Hex „6“	0,112	0,168	0,224	0,280	0,336	0,392	0,448	0,504	0,560	0,672	0,784	0,896	1,008	1,120	1,400	-
Is = Hex „7“	0,120	0,180	0,240	0,300	0,360	0,420	0,480	0,540	0,600	0,720	0,840	0,960	1,080	1,200	1,500	-
Is = Hex „8“	0,128	0,192	0,256	0,320	0,384	0,448	0,512	0,576	0,640	0,768	0,896	1,024	1,152	1,280	1,600	-
Is = Hex „9“	0,136	0,204	0,272	0,340	0,408	0,476	0,544	0,612	0,680	0,816	0,952	1,088	1,224	1,360	1,700	-
Is = Hex „A“	0,144	0,216	0,288	0,360	0,432	0,504	0,576	0,648	0,720	0,864	1,008	1,152	1,296	1,440	1,800	-
Is = Hex „B“	0,160	0,240	0,320	0,400	0,480	0,560	0,640	0,720	0,800	0,960	1,120	1,280	1,440	1,600	2,000	-
Is = Hex „C“	0,176	0,264	0,352	0,440	0,528	0,616	0,704	0,792	0,880	1,056	1,232	1,408	1,584	1,760	2,200	-
Is = Hex „D“	0,192	0,288	0,384	0,480	0,576	0,672	0,768	0,864	0,960	1,152	1,344	1,536	1,728	1,920	2,400	-
Is = Hex „E“	0,208	0,312	0,416	0,520	0,624	0,728	0,832	0,936	1,040	1,248	1,456	1,664	1,872	2,080	2,600	-
Is = Hex „F“	0,224	0,336	0,448	0,560	0,672	0,784	0,896	1,008	1,120	1,344	1,568	1,792	2,016	2,240	2,800	-

Table 5.4: Test current via the CD winding with the IE> step and the different Is setting values

* When the earth current setting is <0.9 x Is a three-phase test system has to be used for correct testing. With a single-phase test the trip is only triggered from 0.9 x Is on.

5.9 Test procedure by way of example

When testing the WIC1, the tests of the individual equipment should be carried out from the highest setting value to the smallest one. The order ought to be:

- 1) short circuit I>>
- 2) over current I>
- 3) earth current IE>

In here the complete test can only be exemplified with free defined switching points. For the test a single-phase power source has to be used.

General setting:

Is = Nominal Current of the equipment conditional on the used CT, on which all switching points of I>>, I> and IE> are based.

CHAR = either Definite Time or Inverse Characteristic – dependent on the requirement.

Device versions WIC1-1 and WIC1-4 are adjusted via the serial interface by way of a PC. Device versions WIC1-2 are adjusted by way of the DIP switches. Device versions WIC1-3 are adjusted by way of the Hex switches.

Here the test will be performed with the following settings:

```
Is = 1.15
Char = Definite Time
I> = 1.05 x Is
tI> = 1.00s
I>> = 4.00 x Is
tI>> = 0.10s
IE> = 0.9 x Is
tIE> = 0.2s
```

Test step 1): Test of the short circuit step I>>. For this the following parameters have to be blocked:

```
I> = EXIT
tI> = EXIT
IE> = EXIT
```

The single-phase test current has to be increased slowly until the relay or the LED indicator trips (applies only for relay types WIC1-2/3/4). The tripping current can be controlled by the fault value memory. Since the WIC1 is operating phase-selectively, each phase can be tested separately.

Test step 2): Test of the trip delay tI>>

```
Settings: I>> = 4.00 x Is
          tI>> = e.g. 0.10s
```

During the single-phase test the switching point of the I>> has to be rapidly changed from 90% to 120%. The tripping time is ascertained by an external timer. The jump is to be used as start impulse. The trip impulse coming from the flag indicator or the tripping coil serves as stop signal. If a 90% or 120% jump is not possible with the test instrument, then the jump should be from 0 to 120% of the I>>. Dependent on the test parameter for I>> and the set tripping time for tI>>, the charging and boot time needed by the relay has to be deducted. See chapter 4.1.2 Phase Over-Current Time Protection.

Test step 3): Test of the over-current step I>:

Settings: I> = 1.05 x Is
 tI> = EXIT
 I>> = 4.00 x Is
 tI>> = 0.10s
 IE> = EXIT
 tIE> = 0.2s

Test to be carried out as described under "Test step 1".

Test step 4): Test of the trip delay tI>

Settings: I> = 1.05 x Is
 tI> = 1.00s

Test to be carried out as described under „Test step 2“.

Test step 5): Test of the earth current step IE>

Settings: I> = EXIT
 tI> = 1.00s
 I>> = 4.00 x Is
 tI>> = 0.10s
 IE> = 0.9 x Is
 tIE> = EXIT

Test to be carried out as described under „Test step 1“.

Test step 6): Test of the trip delay tIE>

Settings: IE> = 0.9 x Is
 tIE> = 0.2s

Test to be carried out as described under „Test step 2“.

Note:

Tests on the earth current path can only be performed with a single-phase power source if the switching point for the IE> setting is $\geq 0.9 \times I_s$. See chapter 5.8.

5.10 Maintenance

The entire protection system WIC1 is designed for a maintenance-free period of 25 years, hence there are no specific jobs necessary to be done during the operating life of the relays. Very often, a periodical check of the protective adjustments is required by the end user. Such checks are left to the choice of the user and can be carried out as described under 6.2.

5.10.1 Faults

Should, however, faults occur despite the special design of the protection system and the comprehensive quality control, the possibility for fault clearance by the user is only limited. For possible faults and their clearance please see the following table:

Fault	Cause of failure	Remedy
Wrong measuring and tripping values	Test winding short-circuited	Secondary side of test winding always to be operated openly (except when relays are tested)
Wrong measuring and tripping values	Earthing of a winding terminal of the measuring winding	No winding terminal of the measuring winding to be earthed! Earthing is done internally and brought out at terminal PE
Low-energy tripping coil does not trip	Coil polarized with permanent magnet wrong connected to TC+ and TC-	Wiring to be checked

5.10.2 Repair work

The WIC1 is a hermetically sealed relay and so it is not possible to do any repair work at your end. Due to the optimized cost structure, however, repair in our works is also not beneficial. During the warranty period the protection relay is exchanged by us free of charge, provided the failure was not caused by external influences. Should such a situation occur, please contact our local sales agent.

6. Product Specific Features

6.1 Assignment of terminals

The protection relay is equipped with 20 screw-type terminals, make Phoenix and 4 test sockets. The 2 different relay versions are defined by the kind of terminal used:
WIC1-xP plug-in terminals for connection of CTs and trip circuits

Terminal marking	Description
230 V	Remote trip input for auxiliary voltage 230 V AC
115 V	Remote trip input for auxiliary voltage 115 V AC
N	Remote trip input N (earth)
PE	Centre earthing point WIC1
TC+	Electric pulse output +pole
TC-	Electric pulse output, -pole
FI+	Flag indicator output, +pole
FI-	Flag indicator output, -pole
S1	CT measuring winding connection L1
S2	CT measuring winding connection L1
C	CT test winding connection L1
D	CT test winding connection L1
S1	CT measuring winding connection L2
S2	CT measuring winding connection L2
C	CT test winding connection L2
D	CT test winding connection L2
S1	CT measuring winding connection L3
S2	CT measuring winding connection L3
C	CT test winding connection L3
D	CT test winding connection L3
Socket L1	Connection for input test current L1
Socket L2	Connection for input test current L2
Socket L3	Connection for input test current L3
Socket N	Connection for input test current N (earth)

The terminals 230 V, 115 V, N and PE are provided as fixed terminals.

6.1.1 Earthing

For earthing the WIC connection terminal PE is used.

The measuring winding (terminals S1 and S2) of the CTs must not be earthed, otherwise the measurement results are distorted, ensuring in erratic behaviour of the relay. Connection D of the respective test winding can externally be connected with terminal PE.

6.2 Current transformer

Listed CT ranges in relation to the transformer rated currents

	3.00	3.30	4.20	5.50	6.00	6.60	10.00	11.00	12.00	13.80	15.00	15.50	17.50	20.00	21.00	22.00	24.00	U[kV]
50.00	WIC1-W2																	
75.00	14.43																	
100.00	19.25	17.50																
125.00	24.06	21.87	17.18															
160.00	30.79	27.99	21.99	16.80	15.40													
200.00	38.49	34.99	27.49	20.99	19.25	17.50												
250.00	48.11	43.74	34.37	26.24	24.06	21.87	14.43											
315.00	60.62	55.11	43.30	33.07	30.31	27.56	18.19	16.53	15.16									
400.00	76.98	69.98	54.99	41.99	38.49	34.99	23.09	20.99	19.25	16.73	15.40	14.90						
500.00	96.23	87.48	68.73	52.49	48.11	43.74	28.87	26.24	24.06	20.92	19.25	18.62	16.50	14.43				
630.00	121.24	110.22	86.60	66.13	60.62	55.11	36.37	33.07	30.31	26.36	24.25	23.47	20.78	18.19	17.32	16.53	15.16	
800.00		139.96	109.97	83.98	76.98	69.98	46.19	41.99	38.49	33.47	30.79	29.80	26.39	23.09	21.99	20.99	19.25	
1000.00			137.46				87.48	57.74	52.49	48.11	41.84	38.49	37.25	32.99	28.87	27.49	26.24	24.06
1250.00				131.22	120.28	109.35	72.17	65.61	60.14	52.30	48.11	46.56	41.24	36.08	34.37	32.80	30.07	
1600.00						139.96	92.38	83.98	76.98	66.94	61.58	59.60	52.79	46.19	43.99	41.99	38.49	
2000.00							115.47	104.97	96.23	83.67	76.98	74.50	65.98	57.74	54.99	52.49	48.11	
2500.00								131.22	120.28	104.59	96.23	93.12	82.48	72.17	68.73	65.61	60.14	
3150.00										131.79	121.24	117.33	103.92	90.93	86.60	82.67	75.78	
4000.00													131.97	115.47	109.97	104.97	96.23	
S[kVA]																		

	3.00	3.30	4.20	5.50	6.00	6.60	10.00	11.00	12.00	13.80	15.00	15.50	17.50	20.00	21.00	22.00	24.00	U[kV]
125.00	WIC1-W3																	
160.00	30.79																	
200.00	38.49	34.99																
250.00	48.11	43.74	34.37															
315.00	60.62	55.11	43.30	33.07	30.31													
400.00	76.98	69.98	54.99	41.99	38.49	34.99												
500.00	96.23	87.48	68.73	52.49	48.11	43.74	28.87											
630.00	121.24	110.22	86.60	66.13	60.62	55.11	36.37	33.07	30.31									
800.00	153.96	139.96	109.97	83.98	76.98	69.98	46.19	41.99	38.49	33.47	30.79	29.80						
1000.00	192.45	174.95	137.46	104.97	96.23	87.48	57.74	52.49	48.11	41.84	38.49	37.25	32.99	28.87				
1250.00	249.56	218.69	171.83	131.22	120.28	109.35	72.17	65.61	60.14	52.30	48.11	46.56	41.24	36.08	34.37	32.80	30.07	
1600.00		279.93	219.94	167.96	153.96	139.96	92.38	83.98	76.98	66.94	61.58	59.60	52.79	46.19	43.99	41.99	38.49	
2000.00			274.93				174.95	115.47	104.97	96.23	83.67	76.98	74.50	65.98	57.74	54.99	52.49	48.11
2500.00				262.43	240.56	218.69	144.34	131.22	120.28	104.59	96.23	93.12	82.48	72.17	68.73	65.61	60.14	
3150.00						275.55	181.87	165.33	151.55	131.79	121.24	117.33	103.92	90.93	86.60	82.67	75.78	
4000.00							230.94	209.95	192.45	167.35	153.96	148.99	131.97	115.47	109.97	104.97	96.23	
S[kVA]																		

	3.00	3.30	4.20	5.50	6.00	6.60	10.00	11.00	12.00	13.80	15.00	15.50	17.50	20.00	21.00	22.00	24.00	U[kV]
250.00	WIC1-W4																	
315.00	60.62																	
400.00	76.98	69.98																
500.00	96.23	87.48	68.73															
630.00	121.24	110.22	86.60	66.13	60.62													
800.00	153.96	139.96	109.97	83.98	76.98	69.98												
1000.00	192.45	174.95	137.46	104.97	96.23	87.48	57.74											
1250.00	240.56	218.69	171.83	131.22	120.28	109.35	72.17	65.61	60.14									
1600.00	307.92	279.93	219.94	167.96	153.96	139.96	92.38	83.98	76.98	66.94	61.58	59.60						
2000.00	384.90	349.91	274.93	209.95	192.45	174.95	115.47	104.97	96.23	83.67	76.98	74.50	65.98	57.74				
2500.00	481.13	437.39	343.66	262.43	240.56	218.69	144.34	131.22	120.28	104.59	96.23	93.12	82.48	72.17	68.73	65.61	60.14	
3150.00		551.11	433.01	330.66	303.11	275.55	181.87	165.33	151.55	131.79	121.24	117.33	103.92	90.93	86.60	82.67	75.78	
4000.00			549.86	419.89	384.90	349.91	230.94	209.95	192.45	167.35	153.96	148.99	131.97	115.47	109.97	104.97	96.23	
S[kVA]																		

	3.00	3.30	4.20	5.50	6.00	6.60	10.00	11.00	12.00	13.80	15.00	15.50	17.50	20.00	21.00	22.00	24.00	U[kV]
500.00	WIC1-W5																	
630.00	121.24																	
800.00	153.96	139.96																
1000.00	192.45	174.95	137.46															
1250.00	240.56	218.69	171.83	131.22	120.28													
1600.00	307.92	279.93	219.94	167.96	153.96	139.96												
2000.00	384.90	349.91	274.93	209.95	192.45	174.95	115.47											
2500.00	481.13	437.39	343.66	262.43	240.56	218.69	144.34	131.22	120.28									
3150.00	606.22	551.11	433.01	330.66	303.11	275.55	181.87	165.33	151.55	131.79	121.24	117.33						
4000.00	769.80	699.82	549.86	419.89	384.90	349.91	230.94	209.95	192.45	167.35	153.96	148.99	131.97	115.47				
S[kVA]																		

	3.00	3.30	4.20	5.50	6.00	6.60	10.00	11.00	12.00	13.80	15.00	15.50	17.50	20.00	21.00	22.00	24.00	U[kV]
1000.00	WIC1-W6																	
1250.00	240.56																	
1600.00	307.92	279.93																
2000.00	384.90	349.91	274.93															
2500.00	481.13	437.39	343.66	262.43	240.56													
3000.00	577.35	524.86	412.39	314.92	288.68	262.43												
4000.00	769.80	699.82	549.86	419.89	384.90	349.91	230.94											
5000.00	962.25	874.77	687.32	524.86	481.13	437.39	288.68	262.43	240.56									
7500.00	1443.38	1312.16	1030.98	787.30	721.69	656.08	433.01	393.65	360.84	313.78	288.68	279.36	247.44					
10000.00	1924.50	1749.55	1374.64	1049.73	962.25	874.77	577.35	524.86	481.13	418.37	384.90	372.48	329.91	288.68	274.93	262.43	240.56	
S[kVA]																		

7. Annex

7.1 Dimensional drawing relay

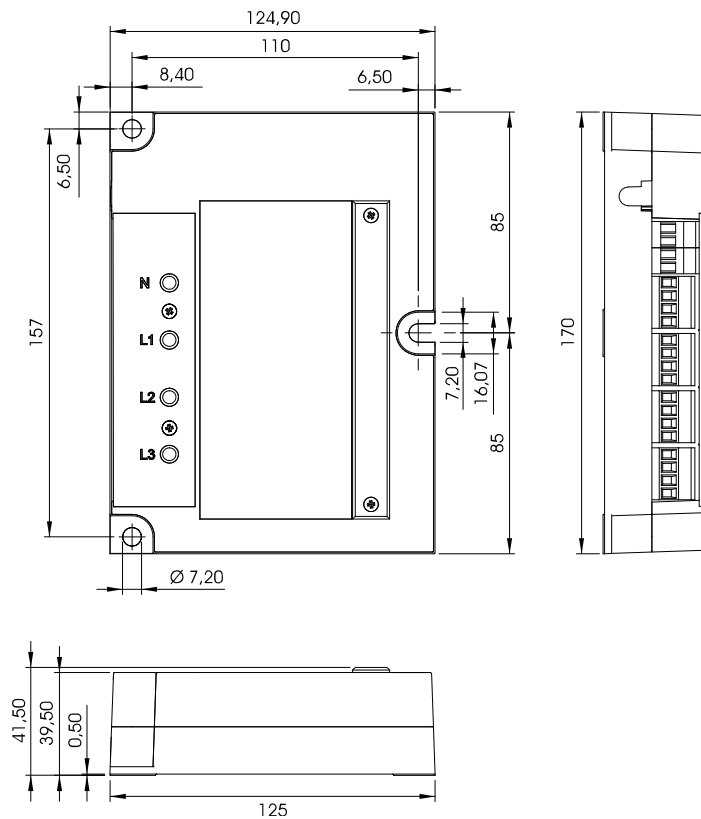


Figure 7.1: Dimensional drawing

7.2 Dimensional drawing flag indicator

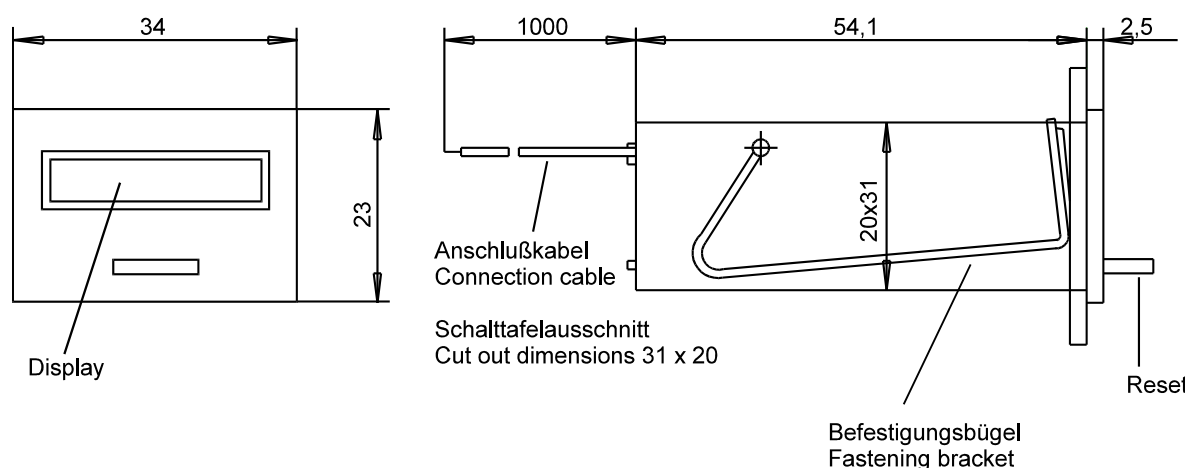


Figure 7.2: Flag indicator W11-SZ4/W11-SZ5

7.3 Order form

Multi characteristic time over current relay		WIC1				
3-phase current measuring I>;I>> self powered – parameter setting via serial interface – parameter setting via DIP switches – parameter setting via HEX switches – Parameter setting via interface, with LED and second operator interface			1 2 3 4			
Connection mode – plug in screw terminal				P		
With additional earth current supervision* I _{E>} – standard 0.2 to 2.5 x I _S (<i>interne geometrische Summenstrombildung</i>)					* E	
With backup-protection (Trip when micro controller is fault) Standard with I>> trip at 20 times highest rated CT current – Trip at 0.8 times lowest rated CT current and full energy storage					* -W	

* Please leave box empty if option is not desired

Flag indicators		WI1	
Small type, front 34 x 23 mm, connection lead 1m			SZ4
Small type, front 34 x 23 mm, connection lead 1m with bi-stable signal contact 230V AC, 3A			SZ5

Accessoires		WIC1	
PC adapter			PC2
Watchdog test unit			TU

Current transformer (1 piece)			WIC1	
16 – 56 A	SVA 100-100-50	10P80		W2AS1
16 – 56 A	SVA 100-100-50	5P80		WE2AS1
32 – 112 A	SVA 100-100-50	5P80		W3AS1
64 – 224 A	SVA 100-100-50	5P80		W4AS1
128 – 448 A	SVA 100-100-50	5P80		W5AS1
256 – 896 A	GSA 120-60-50	5P80		W6AS1

Please observe the note in chapter 4.7.7.

Further designs e.g. supporting type, plug-on type etc. on request.

Note: CT housing in accordance with the customers requirement.

7.4 Commissioning form

List of adjustments for WIC1

Project: _____ Order No.: _____

Functional group: _____ Location: _____ Component Identification: _____

Relay Function: _____ Date: _____

Parameter Setting

Function		Unit	Default Setting	Actual Setting
	CT Type		W2	
IS	Rated CT current	A	16	
Char	Trip characteristic		DEFT	
I>	Pickup value for DMT characteristic or start value of the IMT characteristic	x IS	0.9	
tl>	Tripping time for DMT characteristic	s	0.04	
a	Multiplier for IMT characteristic	s	--	
I>>	Pickup value for short-circuit element	x IS	1	
tl>>	Tripping time for short-circuit element	s	0.04	
IE>	Pickup value for earth fault element (only type E)	x IS	0.2	
tlE>	Tripping time for earth fault element	s	0.1	

Signature Checker: _____ Signature customer: _____

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