AREVA

US STEEL KOSICE / SLOVAKIA
50.3023.01

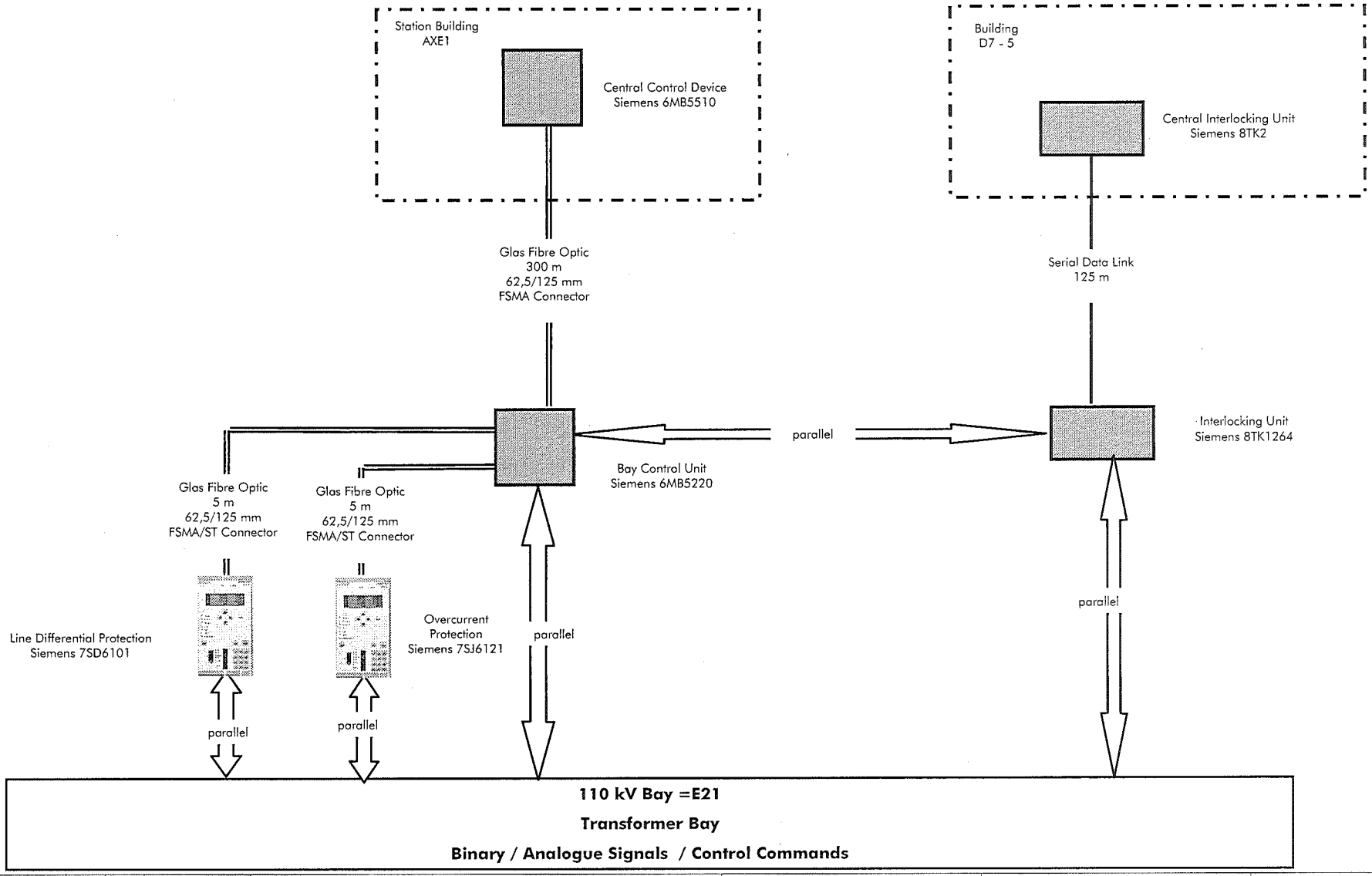
Protection and Control System 110 kV – S/S T01/T02

Protection and Digital Control Schemes

025.011551-4005 (4) 02
50.3023.01.000.701.xxx

Scope of Supply

DIGITAL CONTROL SYSTEM
US STEEL KOSICE
S/S T01



State	Revision	Date	Name	Norm
02	AS BUILT	01.12.06	Kluge	Drawn
01	Modification	10.08.05	Kluge	Checked
				Date 21.04.2005

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

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DIGITAL CONTROL AND PROTECTION SCHEME

50.3023.01.000.701.xxx

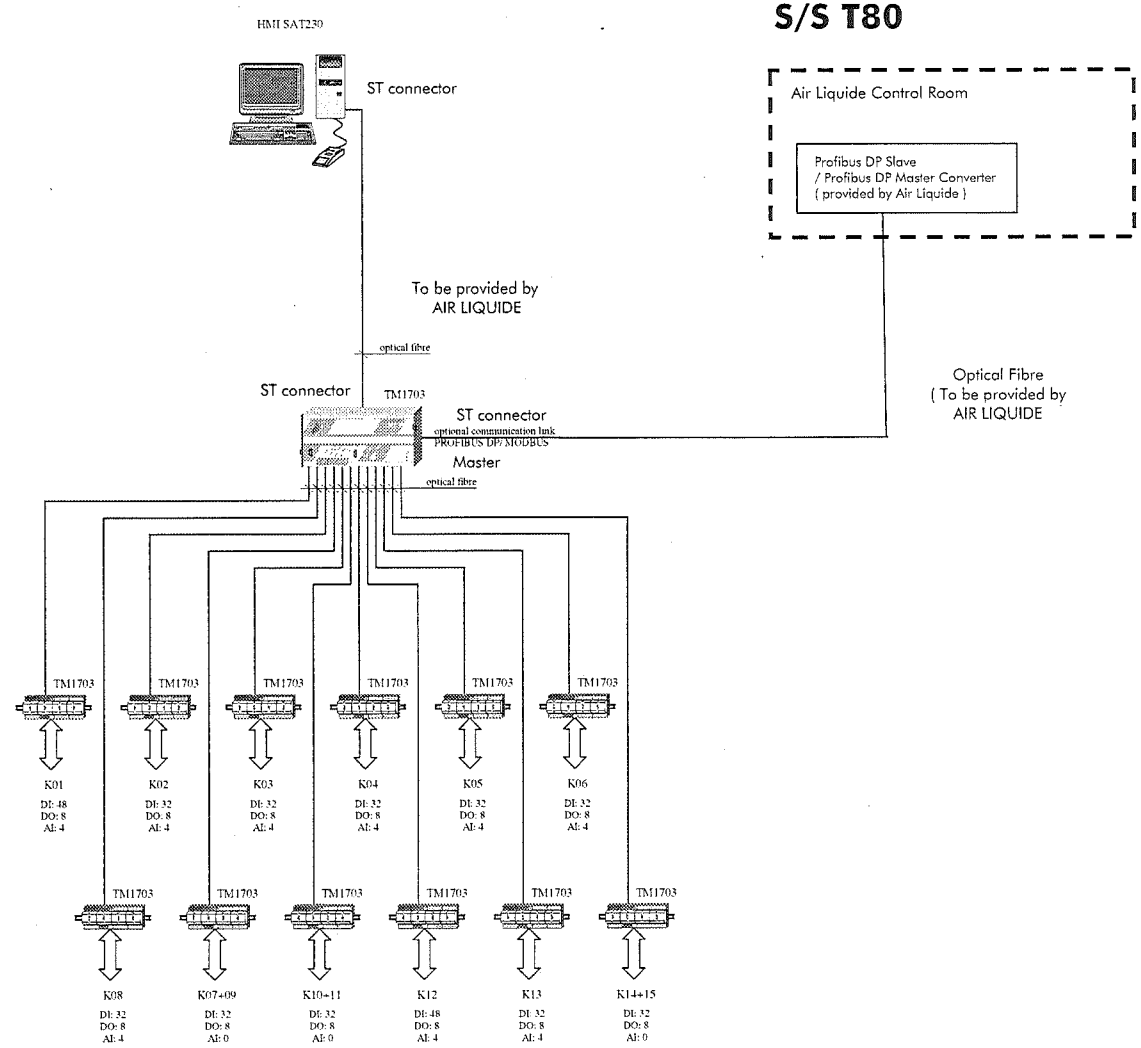
025.011551-4005 (4) 02

Sheet 2
12 Sh.

6.3**

Scope of Supply

DIGITAL CONTROL SYSTEM
US STEEL KOSICE
S/S T80



6,3 kV SUBSTATION T80

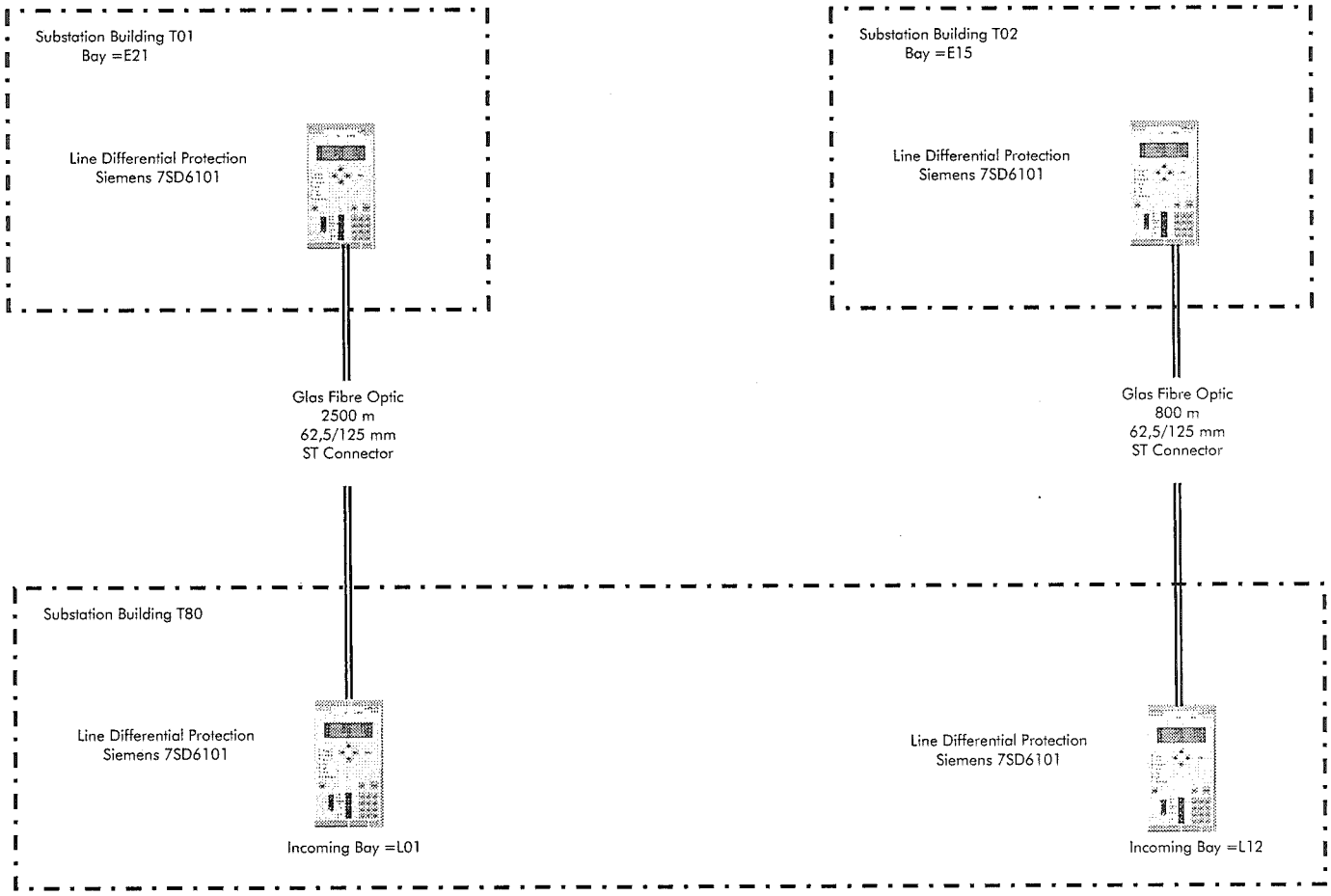
Binary / Analogue Signals / Control Commands according to Signal List

6. 3**

				Date	21.04.2005	US STEEL KOSICE / SLOVAKIA 50.3023.01	AREVA	DIGITAL CONTROL AND PROTECTION SCHEME	50.3023.01.000.701.xxx
02	AS BUILT	01.12.06	Kluge	Drawn	Kluge				025.011551-4005 (4) 02
01	Modification	10.08.05	Kluge	Checked					Sheet 3 / 12 Sh.
State	Revision	Date	Name	Norm		Origin:	Sub.f.:		

Scope of Supply

LINE DIFFERENTIAL PROTECTION SYSTEM
US STEEL KOSICE
S/S T01/T02/T80

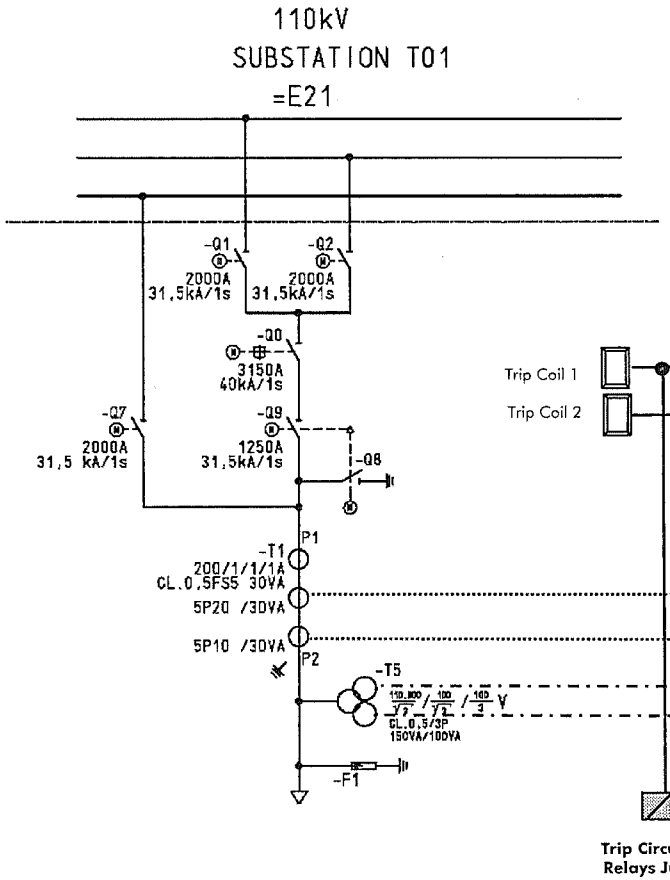


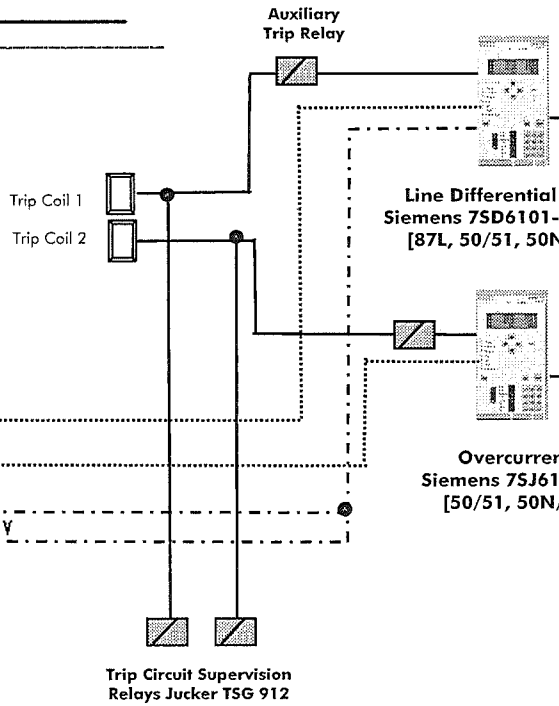
				Date	21.04.2005	US STEEL KOSICE / SLOVAKIA 50.3023.01	AREVA	DIGITAL CONTROL AND PROTECTION SCHEME	50.3023.01.000.701.xxx	
02	AS BUILT	01.12.06	Kluge	Drawn	Kluge					
01	Modification	10.08.05	Kluge	Checked					025.011551-4005 (4) 02	Sheet 4 12 Sh.
State	Revision	Date	Name	Norm		Origin:	Sub.f.:			

6.32**

Scope of Supply

PROTECTION SYSTEM OF TRANSFORMER BAY
S/S T01 110 kV





Line Differential Protection
Siemens 7SD6101-5FB39-0BN0
[87L, 50/51, 50N/51N, 86]

Digital Inputs:
- *7SJ6121: Protection Trip Signal [Remote Trip]*
- *Control: Manual Close*
- *Position Indication: CB Closed*
- *Measuring Voltage: MCB-Trip VT*

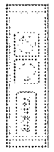
Digital Outputs:
- *Protection Trip Command / Remote Trip Command [Power Transformer / Quenching Choke / Earthing Transformer]*
- *Relay Blocked/failed*
- *Power Transformer: Collective Warning Signal (to fault annunciator)*
- *Power Transformer: Collective Trip Signal (to fault annunciator)*
- *Quenching Choke / Earthing Transformer: Collective Warning Signal (to fault annunciator)*
- *Quenching Choke / Earthing Transformer: Collective Trip Signal (to fault annunciator)*

Overcurrent Protection
Siemens 7SJ6121-5BB30-1FA0
[50/51, 50N/51N, 49, 86]

Digital Inputs:
- *Control: Manual Close*
- *Power Transformer / Quenching Choke / Earthing Transformer: Trip Signal*

Digital Outputs:
- *Protection Trip Command*
- *Relay Blocked/failed*
- *Protection: Trip Signal (to 7SD6101)*

Trip Circuit Supervision
Relays Jucker TSG 912



Test Switch 7XV72 for

Line Diff. Prot. 7SD6101
Overc. Prot. 7SJ6121

Please note: The trip commands initiated by the power transformer protection or earthing transformer / quenching choke will be transmitted from the 6,3 kV side to the 110 kV side via the communication link of protection relays Siemens 7SD6101 using the internal intertripping resp. Remote trip function.

				Date	21.04.2005
02	AS BUILT	01.12.06	Kluge	Drawn	Kluge
01	Modification	10.08.05	Kluge	Checked	
State	Revision	Date	Name	Norm	

US STEEL KOSICE / SLOVAKIA
50.3023.01
Origin: Sub.f.:

AREVA

DIGITAL CONTROL AND PROTECTION SCHEME

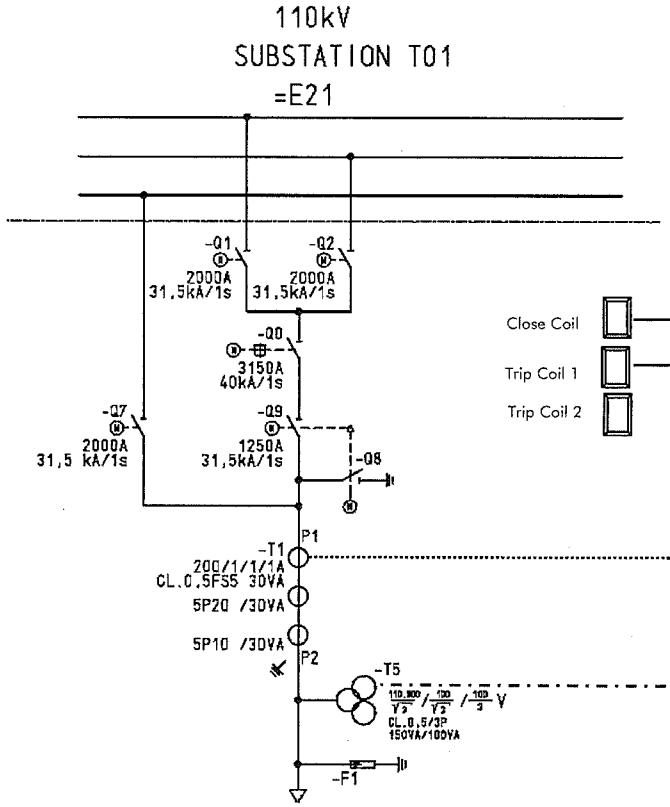
50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 5
12 Sh.

Scope of Supply

CONTROL SYSTEM OF TRANSFORMER BAY
S/S T01 110 kV



Close Coil
Trip Coil 1
Trip Coil 2

Analogue Signal 0-20 mA:
Active Power P
(from measuring transducer)

Digital Outputs to 8TK1:

▪ Blocking / Unblocking	Acknowledgement
▪ Switching Request	
Close Command	Open Command
Switching Q0	Switching Q1
Switching Q2	Switching Q7
Switching Q8	Switching Q9

Bay Control Unit
Siemens 6MB5220-1DC15-6BA2

Digital Inputs:

- *Q0 collective signal (Motor drive: MCB trip/Spring not charged/Alarm SF6 /Operating Lockout SF6/Local Operation) [from fault annunciator]*
- *Measuring Panel/VT Terminal Box: MCB-Trip [from fault annunciator]*
- *Protection Panel: MCB-Trip DC / Trip Circuit Supervision: Failure [from fault annunciator]*
- *Protection Trip Command / Remote Trip Command [Power Transformer / Quenching Choke / Earthing Transformer] [from fault annunciator]*
- *Position Indication from 8TK1*

-Q0 closed	-Q0 open
–Q1 closed	–Q1 open
–Q2 closed	–Q2 open
–Q7 closed	–Q7 open
–Q8 closed	–Q8 open
–Q9 closed	–Q9 open

- *Collective Warning Signal (EPROM Failure/Serial Data Link dist./Position Indication not correct /Command execution not correct [from 8TK1]*
- *CB tripped [from 8TK1]*
- *Switch S1 „On" (without Interlocking) [from 8TK1]*
- *Switch S5 in Position „Local Operation" / „Off"[from 8TK1]*
- *Interlocking conditions violated [from 8TK1]*
- *Running time exceeded [from 8TK1]*

Interlocking Unit Siemens
8TK1264-0AA26-6DA3BB

Digital Inputs:

- *Switching Request from 6MB5220*

Close Command	Open Command	Switching Q0
Switching Q1	Switching Q2	Switching Q7
Switching Q8	Switching Q9	

- *Position Indication*

-Q0 closed	-Q0 open	–Q1 closed
–Q1 open	-Q2 closed	–Q2 open
–Q7 closed	–Q7 open	–Q8 closed
–Q8 open	–Q9 closed	–Q9 open

- *Comands from 6MB5220*

Blocking / Unblocking	Acknowledgement

Digital Outputs:

- *Position Indication to 6MB5220*

-Q0 closed	-Q0 open	–Q1 closed
–Q1 open	–Q2 closed	–Q2 open
–Q7 closed	-Q7 open	–Q8 closed
–Q8 open	–Q9 closed	–Q9 open

▪On-Command-Q0	Off-Command -Q0
▪ Close Command –Q1	Open Command –Q1
▪ Close Command –Q2	Open Command –Q2
▪ Close Command–Q7	Open Command –Q7
▪ Close Command–Q8	Open Command –Q8
▪ Close Command–Q9	Open Command –Q9

- *Collective Warning Signal (EPROM Failure/Serial Data Link dist./Position Indication not correct /Command execution not correct [to 6MB5220]*
- *CB tripped [to 6MB5220]*
- *Switch S1 „On" (without Interlocking) [to 6MB5220]*
- *Switch S5 in Position „Local Operation" / „Off"[to 6MB5220]*
- *Interlocking conditions violated [to 6MB5220]*
- *Running time exceeded [to 6MB5220]*

6.3"

State	Revision	Date	Name	Norm
02	AS BUILT	01.12.06	Kluge	
01	Modification	10.08.05	Kluge	

Date 21.04.2005 | Drawn Kluge | Checked | Origin: | Sub.f.:

US STEEL KOSICE / SLOVAKIA
50.3023.01

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DIGITAL CONTROL AND PROTECTION SCHEME

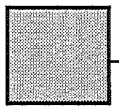
50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 6
12 Sh.

Scope of Supply

FAULT ANNUNCIATION SYSTEM OF TRANSFORMER BAY
S/S T01 110 kV



Fault Annunciator
2 x EES SSM 16-R

Digital Inputs:
- *Q0: Operating Lockout SF6*
- *Q0: Spring not charged*
- *Q0: Alarm SF6*
- *Q0, Motor drive: MCB trip*
- *Q0: Local Operation*
- *Q1/Q2/Q7/Q9, Motor drive: MCB-Trip*
- *Q1/Q2/Q7/Q9: Local Operation*
- *Control Panel: MCB-Trip DC supply*
- *Voltage Transformer Terminal Box: Measuring Voltage MCB-Trip*
- *Voltage Transformer Terminal Box: MCB-Trip AC supply*
- *Metering panel: Measuring Voltage MCB-Trip, Metering/Measuring winding*
- *Metering panel: Measuring Voltage MCB-Trip, Protection winding*
- *Metering Panel: MCB-Trip AC supply*
- *Protection Panel: MCB-Trip AC supply*
- *Control Panel: MCB-Trip AC supply*
- *Protection Panel: MCB-Trip DC supply 1.11*
- *Protection Panel: MCB-Trip DC supply 1.21*
- *Protection Panel: MCB-Trip DC supply 1.31*
- *Protection Panel: MCB-Trip DC supply 1.12*
- *Protection Panel: MCB-Trip DC supply 1.32*
- *Protection Panel: Trip Circuit Supervision: Failure*
- *Power Transformer: Collective Warning Signal*
- *Power Transformer: Collective Trip Signal*
- *Quenching Choke / Earthing Transformer: Collective Warning Signal*
- *Quenching Choke / Earthing Transformer: Collective Trip Signal*

Digital Outputs to 6MB5220
- *Q0 collective signal (Motor drive: MCB trip/Spring not charged/Alarm SF6 /Operating Lockout SF6/Local Operation) [from fault annunciator]*
- *Measuring Panel/VT Terminal Box: MCB-Trip [from fault annunciator]*
- *Protection Panel: MCB-Trip DC / Trip Circuit Supervision: Failure [from fault annunciator]*
- *Protection Trip Command / Remote Trip Command [Power Transformer / Quenching Choke / Earthing Transformer] [from fault annunciator]*

6.3**

State	Revision	Date	Name	Norm	
02	AS BUILT	01.12.06	Kluge	Drawn	Kluge
01	Modification	10.08.05	Kluge	Checked	
				Date	21.04.2005

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

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DIGITAL CONTROL AND PROTECTION SCHEME

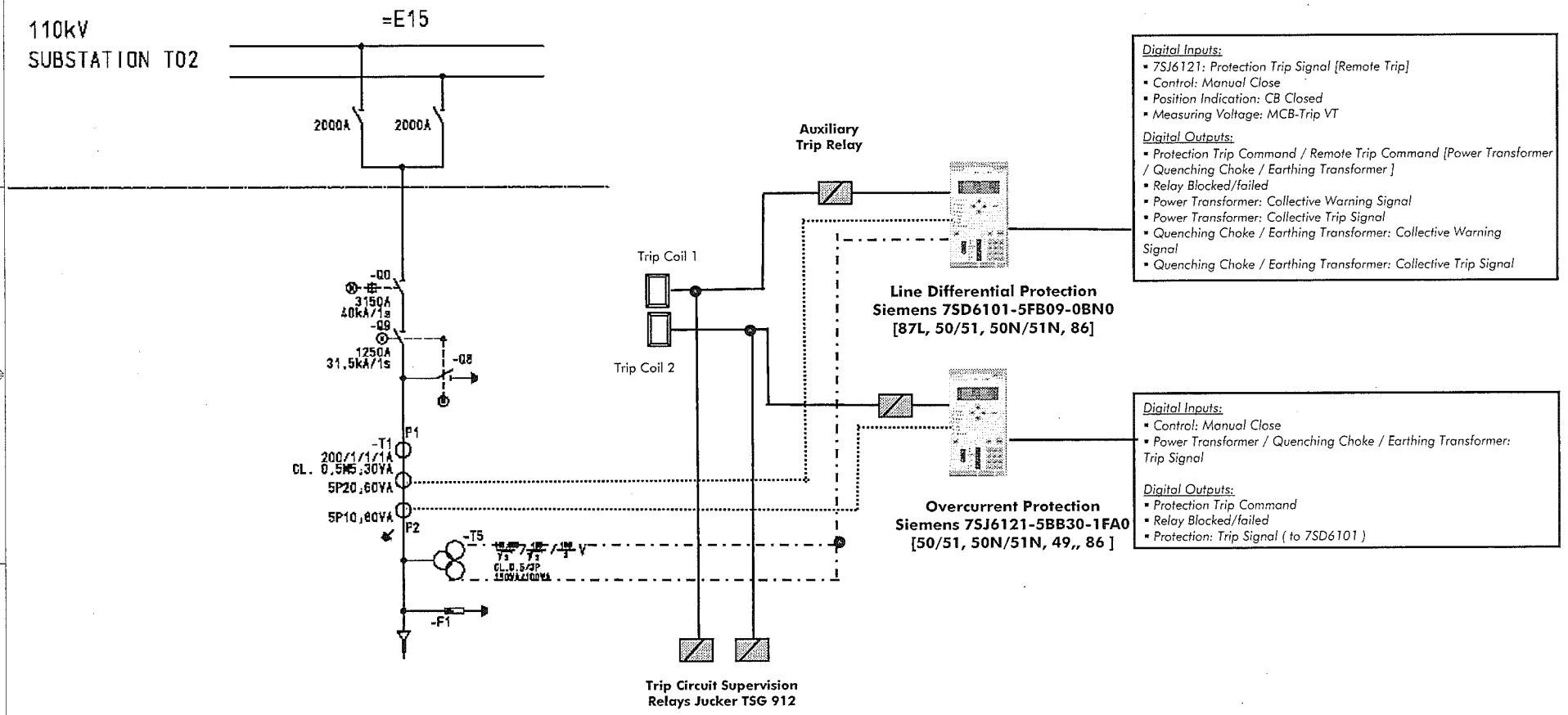
50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 7
12 Sh.

Scope of Supply

PROTECTION SYSTEM OF TRANSFORMER BAY
S/S T02 110 kV



Digital Inputs:
- *7SJ6121: Protection Trip Signal [Remote Trip]*
- *Control: Manual Close*
- *Position Indication: CB Closed*
- *Measuring Voltage: MCB-Trip VT*

Digital Outputs:
- *Protection Trip Command / Remote Trip Command [Power Transformer / Quenching Choke / Earthing Transformer]*
- *Relay Blocked/failed*
- *Power Transformer: Collective Warning Signal*
- *Power Transformer: Collective Trip Signal*
- *Quenching Choke / Earthing Transformer: Collective Warning Signal*
- *Quenching Choke / Earthing Transformer: Collective Trip Signal*

Digital Inputs:
- *Control: Manual Close*
- *Power Transformer / Quenching Choke / Earthing Transformer: Trip Signal*

Digital Outputs:
- *Protection Trip Command*
- *Relay Blocked/failed*
- *Protection: Trip Signal (to 7SD6101)*

Test Switch 7XV72 for

Line Diff. Prot. 7SD6101
Overc. Prot. 7SJ6121

Please note: The trip commands initiated by the power transfgirmer protection or earthing trabbsformer / quechnicng cheke will be transmitted from the 6,3 kV side to the 110 kV side via the communication link of protection relays Siemens 7SD6101 using the internal intertripping resp. Remote trip function.

State	Revision	Date	Name	Norm
02	AS BUILT	01.12.06	Kluge	Drawn
01	Modification	10.08.05	Kluge	Checked

Date 21.04.2005

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

AREVA

DIGITAL CONTROL AND PROTECTION SCHEME

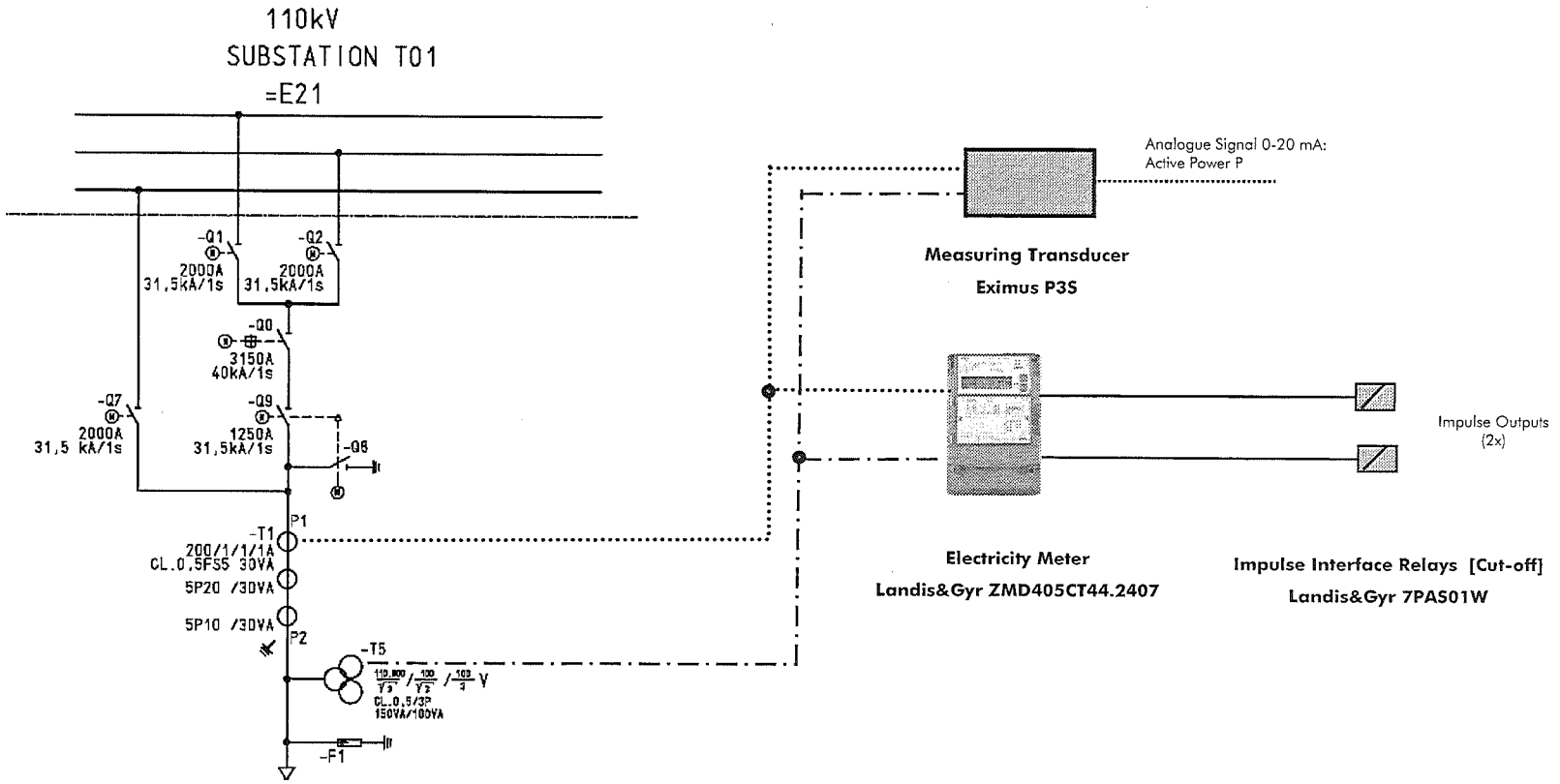
50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 8
12 Sh.

Scope of Supply

METERING SYSTEM OF TRANSFORMER BAY
S/S T01 110 kV



				Date	21.04.2005
02	AS BUILT	01.12.06	Kluge	Drawn	Kluge
01	Modification	10.08.05	Kluge	Checked	
State	Revision	Date	Name	Norm	

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

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DIGITAL CONTROL AND PROTECTION SCHEME

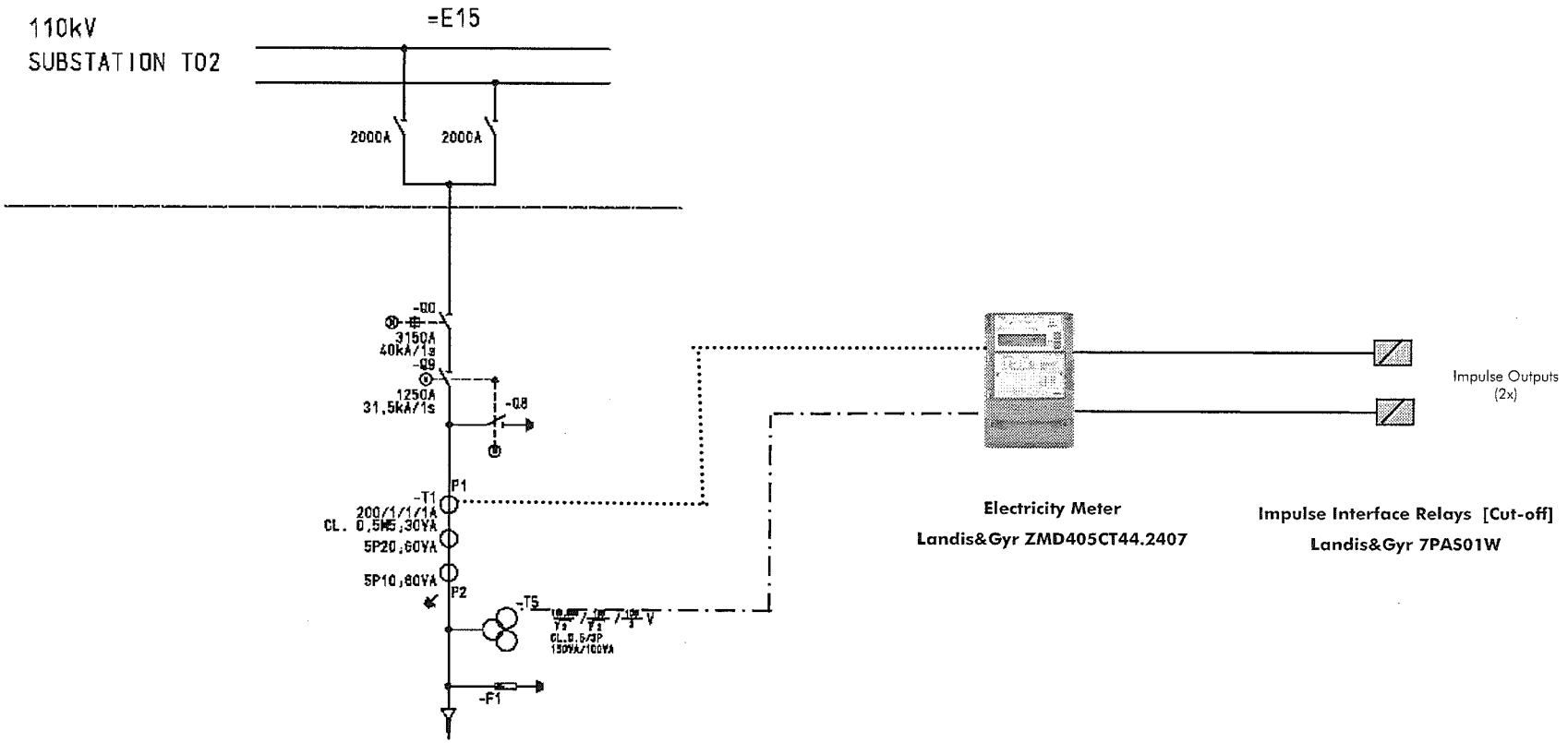
50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 9
12 Sh.

Scope of Supply

METERING SYSTEM OF TRANSFORMER BAY
S/S T02 110 kV



State	Revision	Date	Name	Norm
02	AS BUILT	01.12.06	Kluge	
01	Modification	10.08.05	Kluge	

Date 21.04.2005
Drawn Kluge
Checked

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

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DIGITAL CONTROL AND
PROTECTION SCHEME

50.3023.01.000.701.xxx

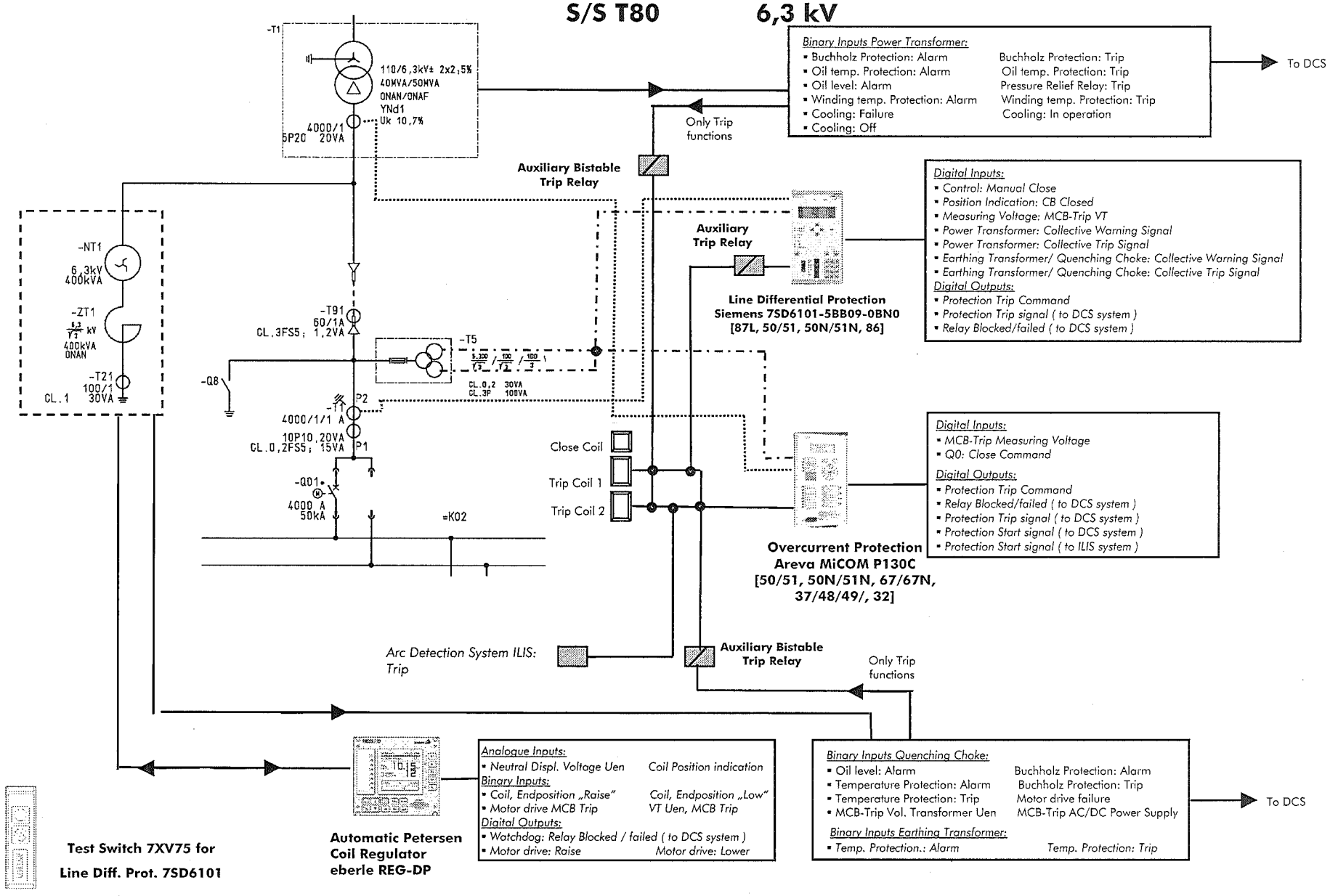
025.011551-4005 (4) 02

Sheet 10
12 Sh.

6.3**

Scope of Supply

PROTECTION SYSTEM OF INCOMING BAYS =L01/=L12
S/S T80 6,3 kV



Binary Inputs Power Transformer:

- Buchholz Protection: Alarm — Buchholz Protection: Trip
- Oil temp. Protection: Alarm — Oil temp. Protection: Trip
- Oil level: Alarm — Pressure Relief Relay: Trip
- Winding temp. Protection: Alarm — Winding temp. Protection: Trip
- Cooling: Failure — Cooling: In operation
- Cooling: Off

Digital Inputs:

- *Control: Manual Close*
- *Position Indication: CB Closed*
- *Measuring Voltage: MCB-Trip VT*
- *Power Transformer: Collective Warning Signal*
- *Power Transformer: Collective Trip Signal*
- *Earthing Transformer/ Quenching Choke: Collective Warning Signal*
- *Earthing Transformer/ Quenching Choke: Collective Trip Signal*

Digital Outputs:

- *Protection Trip Command*
- *Protection Trip signal (to DCS system)*
- *Relay Blocked/failed (to DCS system)*

Digital Inputs:

- *MCB-Trip Measuring Voltage*
- *Q0: Close Command*

Digital Outputs:

- *Protection Trip Command*
- *Relay Blocked/failed (to DCS system)*
- *Protection Trip signal (to DCS system)*
- *Protection Start signal (to DCS system)*
- *Protection Start signal (to ILIS system)*

Analogue Inputs:

- *Neutral Displ. Voltage Uen* — *Coil Position indication*

Binary Inputs:

- *Coil, Endposition „Raise"* — *Coil, Endposition „Low"*
- *Motor drive MCB Trip* — *VT Uen, MCB Trip*

Digital Outputs:

- *Watchdog: Relay Blocked / failed (to DCS system)*
- *Motor drive: Raise* — *Motor drive: Lower*

Binary Inputs Quenching Choke:

- Oil level: Alarm — Buchholz Protection: Alarm
- Temperature Protection: Alarm — Buchholz Protection: Trip
- Temperature Protection: Trip — Motor drive failure
- MCB-Trip Vol. Transformer Uen — MCB-Trip AC/DC Power Supply

Binary Inputs Earthing Transformer:

- *Temp. Protection.: Alarm* — *Temp. Protection: Trip*

State	Revision	Date	Name	Norm
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01	Modification	10.08.05	Kluge	Checked
				Date 21.04.2005

US STEEL KOSICE / SLOVAKIA
50.3023.01

Origin: Sub.f.:

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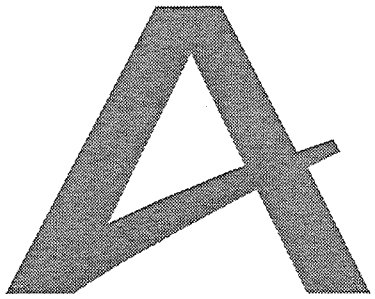
DIGITAL CONTROL AND PROTECTION SCHEME

50.3023.01.000.701.xxx

025.011551-4005 (4) 02

Sheet 11
12 Sh.



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