

RefleX² Protection and Control

RefleX² - 205

Overcurrent protection
Directional earth fault protection
Phase unbalance protection
1..6 shot autoreclosure
Communication (IEC 60 870-5-103)



2-stage OC, 2-stage dir.EF,
AR, phase-unbal., and COMM
Model 205

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Menu (setting group #1)

In-service display	(See separate description of sub-menu 'In-service displays')	In-service display Press 'enter' to toggle displays
Trip records	(See separate description of sub-menu 'Trip Records')	Press 'enter' to display recorded data After selecting a record use 'arrow up' or 'arrow down' to display additional information. Leave monitor by pressing 'Esc'.
Low current #1 I> 160/4A t> 1.5s Def.t CT 200/5A In5A	_____	Low phase current Setting group # Primary/secondary current set value Delay Characteristic Primary/secondary CT Rated phase current
High current #1 I>> 1200/30A t>> 0.05s Def.t CT 200/5A In5A	_____	High phase current Setting group # Primary/secondary current set value Delay Characteristic Primary/secondary CT Rated phase current
Ph unbalance #1 I2 0.4*I1 t2 3s Trip Off	_____	Phase unbalance Setting group # Neg. seq. starting ratio (I1: pos. seq. current) Delay (definite time) Trip On / Off
DEF Uo /angle #1 Uo 30V Trip off Iø direction 90° Iø sector 120°	_____	Dir. EF voltage / angle Setting group # Secondary voltage set value Trip ON/OFF Tripping sector direction for Iø with Uo reference Tripping sector opening angle
DEF current #1 Io> 80/0.8A tø> 1.5s CT 100/1A In1A	_____	Dir.earth fault low current Setting group # Primary/secondary current set value Delay (after Io>, Uo and angle 'operation') Primary/secondary CT Rated EF current
DEF current #1 Io>> 90/0.9A tø>> 1.0s CT 100/1A In1A	_____	Dir.earth fault high current Setting group # Primary/secondary current set value Delay (after Io>>, Uo and angle 'operation') Primary/secondary CT Rated EF current
AR On #1 Max no. shots 2 Reclaim t 100s Close pls 0.2s	_____	AR On/ Off Setting group # Maximum no. of shots selected. 1...6 available Reclaim time Close pulse (circuit breaker in-pulse) *)
AR shot1 On #1 Dead time 0.7s Activated by: Iph DEF --	_____	All AR shots (shot1, shot2 ... shot6) : Depending on the selected maximum no. of AR shots the menu will display the settings for each shot. In this example two shots are selected. For each shot this information is given: Shot on/off Setting group # Dead time: Time before reclosure *) Activated by: telling which part of the relay or which external lines can activate the shot
AR shot2 Off #1 Dead time 15s Activated by: Iph -- --	_____	
Comm. IEC ON Config. Star Address 45 Meas. value 1.2	_____	Configuration Comm. On/Off Relay address Value of measurand
YMD 2002-12-24 HMS 13:52:36 Password **** Freq. 50Hz	_____	Year - month - day 24 hour clock Four-digit password. Factory default: 1111 Rated power system frequency

*) Please observe that the dead time must always be longer than the close pulse

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Menu (setting group #2)

In-service display	(See separate description of sub-menu 'In-service displays')	In-service display Press 'enter' to toggle displays
Trip records	(See separate description of sub-menu 'Trip Records')	Press 'enter' to display recorded data After selecting a record use 'arrow up' or 'arrow down' to display additional information. Leave monitor by pressing 'Esc'.
Low current #2 I> 160/4A t> 1.5s Def.t CT 200/5A In5A	_____	Low phase current Setting group # Primary/secondary current set value Delay Characteristic Primary/secondary CT Rated phase current
High current #2 I>> 1200/30A t>> 0.05s Def.t CT 200/5A In5A	_____	High phase current Setting group # Primary/secondary current set value Delay Characteristic Primary/secondary CT Rated phase current
Ph unbalance #2 I2 0.4*I1 t2 3s Trip Off	_____	Phase unbalance Setting group # Neg. seq. starting ratio (I1: pos. seq. current) Delay (definite time) Trip On / Off
DEF Uo /angle #2 Uo 30V Trip off Iø dir. 90° Iø sector 120°	_____	Dir. EF voltage / angle Setting group # Secondary voltage set value Trip ON/OFF Tripping sector direction for Iø with Uo reference Tripping sector opening angle
DEF current #2 Io> 80/0.8A tø> 1.5s CT 100/1A In1A	_____	Dir.earth fault low current Setting group # Primary/secondary current set value Delay (after Io>, Uo and angle 'operation') Primary/secondary CT Rated EF current
DEF current #2 Io>> 90/0.9A tø>> 1.0s CT 100/1A In1A	_____	Dir.earth fault high current Setting group # Primary/secondary current set value Delay (after Io>>, Uo and angle 'operation') Primary/secondary CT Rated EF current
AR On #2 Max no. shots 2 Reclaim t 100s Close pls 0.2s	_____	AR On/ Off Setting group # Maximum no. of shots selected. 1...6 available Reclaim time Close pulse (circuit breaker in-pulse) *)
AR shot1 On #2 Dead time 0.7s Activated by: Iph DEF --	_____	All AR shots (shot1, shot2 ... shot6) : Depending on the selected maximum no. of AR shots the menu will display the settings for each shot. In this example two shots are selected. For each shot this information is given: Shot on/off Setting group # Dead time: Time before reclosure *) Activated by: telling which part of the relay or which external lines can activate the shot
AR shot2 Off #2 Dead time 15s Activated by: Iph -- --	_____	
Comm. IEC ON Config. Star Address 45 Meas. value 1.2	_____	Configuration Comm. On/Off Relay address Value of measurand
YMD 2002-12-24 HMS 13:52:36 Password **** Freq. 50Hz	_____	Year - month - day 24 hour clock Four-digit password. Factory default: 1111 Rated power system frequency

*) Please observe that the dead time must always be longer than the close pulse

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

In-service displays

By commissioning of the relay the in-service display will show the primary phase currents.
 Press 'enter' to switch between the different in-service displays
 Chosen in-service display will automatically be default in-service display

In-service display

OC, DEF, Ph-Unb
 IL1 124A
 IL2 120A
 IL3 123A

In service display
 Primary current in phase 1
 Primary current in phase 2
 Primary current in phase 3

OC, DEF, Ph-Unb
 Io 0.1A
 Uo 5V
 EF Angle 86°

Alternativ in-service display
 Secondary EF-current
 Secondary EF-voltage
 EF angle

OC, DEF, Ph-Unb
 I1 100A
 I2 0.1*I1

Alternativ in-service display
 Positive sequence value of the load current
 I2 = Negative sequence factor * I1

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Trip records

After a relay trip the display showing date and time of the trip automatically appears.

Each trip is automatically assigned a separate serial number.

All displays show recordings subsequent to relay tripping. The last five recordings are always stored.

By using arrow up/arrow down the user may access all relevant information in the displays below.

Only trip records (displays) with active information is stored and/or displayed after a trip.

Trip records

This display is part of the main menu

After selecting a record use 'arrow up' or 'arrow down' to display additional information.

Leave trip records by pressing 'Esc'.

Trip 333
2002-12-24
12:13:14.123
Delay 0.05s

Header (in this case looking at trip no. 333)

Date of 'trip 333'

Time of 'trip 333'

Delay of 'trip 333'

Trip 333
I> I>>*
Io> Io>>
I2

Trip indication (trip 333)

* indicates type of trip

Trip 333
IL1 1400A
IL2 1390A
IL3 1400A

Trip 333

Primary phase current

Primary phase current

Primary phase current

Trip 333
Io 0A
Uo 0V
EF Angle 0°

Trip 333

Earth fault current

Earth fault voltage

Earth fault angle

Trip 333
I1 100A
I2 0*I1

Trip 333

Phase unbalance (positiv sequence current)

Phase unbalance (negative sequence current)

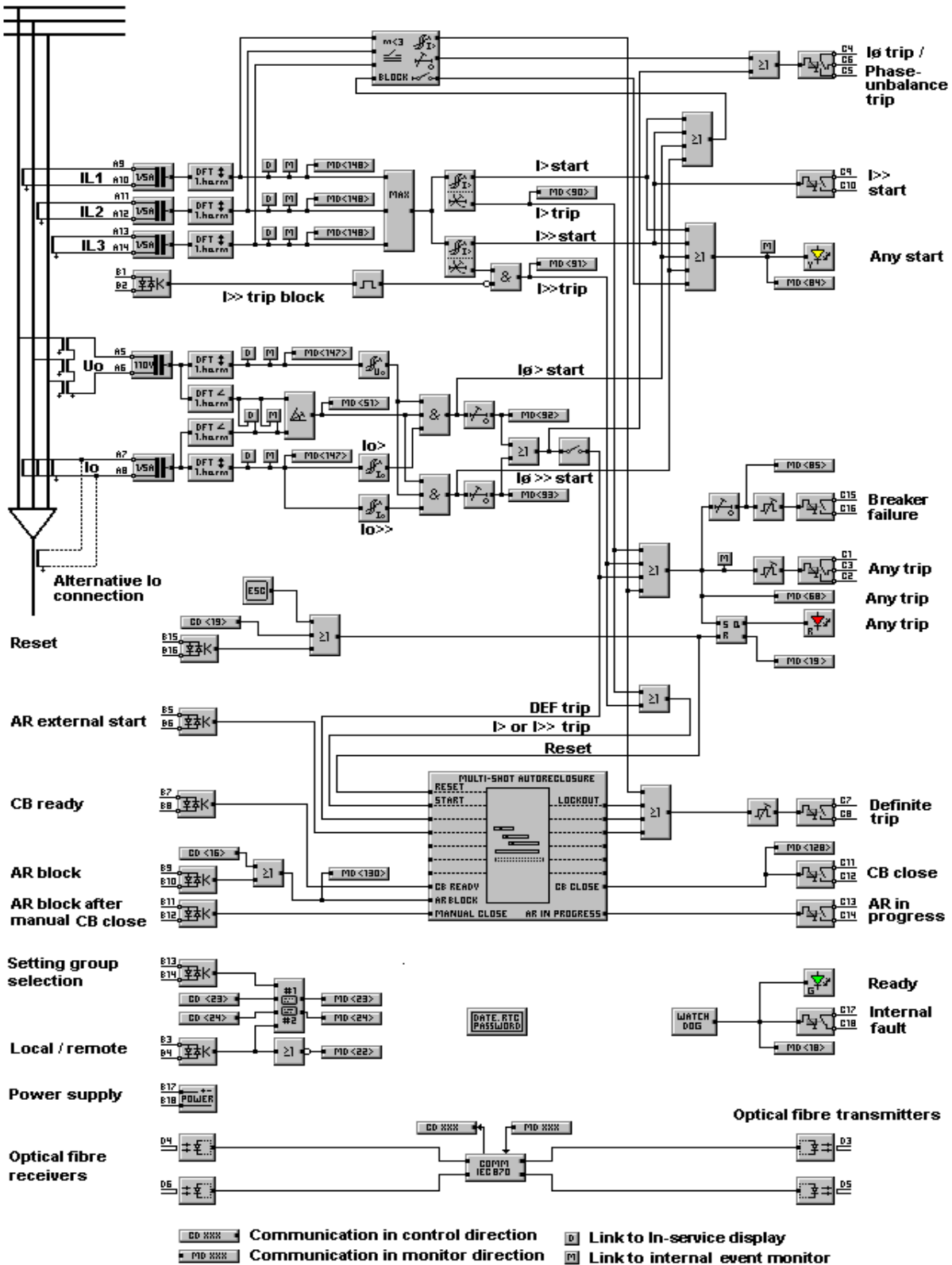
Trip 333
AR has been
activated

Trip 333

This display only appears after an autoreclosure.

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Logic diagram



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RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Technical data

Overcurrent protection

Measurement		Three phases
Current settings 1A rated input.	I>, I>>	0.200 - 75.0 A and block
Current settings 5A rated input.	I>, I>>	1.00 - 375 A and block
Time characteristics		NI, VI, EI, LTI and Def.t
Time multipliers for inverse time characteristics	k>,k>>	0.10 - 1.20 and block
Definite time settings	t>,t>>	0.01 - 9.99 s and block
Resetting ratio		>0.97
Harmonic measurement		1st harmonic

Phase unbalance protection

Negative sequence starting ratio *)	I2	0.100 - 0.5 * I1 and block
Positive sequence measuring limit 1A rated input		0.1 A
Positive sequence measuring limit 5A rated input		0.5 A
Timer	t2	0.1 - 99.9 s and block
Resetting ratio		>0.97
Trip function		On / Off
*) I1 = the positive sequence value of the load current		
*) I2 = the negative sequence value of the load current		

Directional Earth Fault protection

Current setting 1A rated input	Io>, Io>>	0.005 - 2.00 A and block
Current setting 5A rated input	Io>, Io>>	0.075 - 30.0 A and block
Timer - definite time	tø>, tø>>	0.01 - 30.0 s and block
Directional reference. Voltage setting	Uo	1.00 - 170 V
Directional reference. Measuring direction	Direction	0 - 360°
Directional reference. Operational sector	Sector	0 - 360°
Resetting ratio (current and voltage)		>0.97
Harmonic measurement (current and voltage)		1st harmonic

Autoreclosure

Number of shots	Max no. shots	1...6
Dead times (AR1 ...AR6). **)	Dead time	0.30 - 999 s
Reclaim time (common setting for all AR shots)	Reclaim t	0.30 - 999 s
Close Pulse (common setting for all AR shots) **)	Close pls	0.10 - 9.99 s
AR activation freely selectable for each shot. Any combination of:		Iph, DEF, external input
Duration of AR block after manual CB close (after activation)		10 s
**) Please observe that the dead time must always be longer than the close pulse		

Breaker failure protection

Trip transfer delay (fixed value)		0.2 s
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Selection between two setting groups

Setting group #1 is active when 'low' input voltage is applied to	Input B13-B14
Setting group #1 could also be selected by signal from comm.	<CD 23>
Setting group #2 is active when 'high' input voltage is applied to	Input B13-B14
Setting group #2 could also be selected by signal from comm.	<CD 24>
Setting group is selected by communication when 'high' input voltage is applied to	Input B3-B4

RefleX Overcurrent, Directional EF, AR and Phase Unbalance Protection

Technical data

System data

Factory default password	1111
Pulse-extension circuit on all trip outputs	0.2 s pulse
Pulse-extension circuit at blocking inputs	50 ms pulse
Rated frequency	50 / 60 Hz

Communication (IEC 60 870-5-103 protocol)

Configuration system	Star or Ring
Address of protection equipment	1 to 254
Value of measurand (x In)	1.2 or 2.4
Optical fibre transmitters	Outputs D3, D5
Optical fibre receivers	Inputs D4, D6

Selection of standard information numbers in monitor direction (MDxxx)

	<FUN>	<INF>
Auto reclosure active	<160>	<16>
Protection inactive (internal fault)	<160>	<18>
LED-reset	<160>	<19>
Characteristic 1 (selected setting group)	<160>	<23>
Characteristic 2 (selected setting group)	<160>	<24>
Earth fault forward i.e. line	<160>	<51>
General trip	<160>	<68>
General start	<160>	<84>
Breaker failure	<160>	<85>
Trip I>	<160>	<90>
Trip I>>	<160>	<91>
Trip IN>	<160>	<92>
Trip IN>>	<160>	<93>
CB on by AR	<160>	<128>
AR blocked	<160>	<130>
Measurands IN, VEN	<160>	<147>
Measurands IL1,2,3	<160>	<148>

Selection of standard information numbers in control direction (CDxxx)

	<FUN>	<INF>
Autorecloser on/off	<160>	<16>
LED-reset	<160>	<19>
Select setting group 1	<160>	<23>
Select setting group 2	<160>	<24>