Signalling unit SACE PR020/K

ABB SACE declina ogni responsabilità per danni a cose e persone dovute alla mancata osservanza delle istruzioni contenute in questo documento.
Le operazioni di installazione e messa in servizio devono essere effettuate da personale qualificato, che abbia una conoscenza dettagliata dell'apparecchiatura.

Imballo
Per ogni unità è previsto un imballo standard, che garantisce la protezione nelle condizioni ambientali richieste per il normale funzionamento in servizio se non definite diversamente nell'ordine di fornitura. Per particolari esigenze di trasporto o deposito contattare ABB SACE.

Installazione
– Ispezione finale : prima della messa in servizio:
a) verificare con esame visivo l'integrità dell'apparecchio, i collegamenti realizzati e l'eventuale settaggio dei dip-switch ;
b) verificare la funzionalità dell'apparecchio, effettuando l'autotest.
c) effettuare le prove previste dalle Norme sull'impianto completo.

PER QUALSIASI ESIGENZA CONTATTARE ABB SACE.

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1. General

1.1. Foreword

Carefully read the whole of this document before installation and start-up of the PR020/K unit.

The PR020/K unit, connected to the protection units from the Isomax and Emax series, allows the signalling of various events which can be verified during normal operation of the connected protection unit.
In these events, the PR020/K unit operates the internal relays fitted with power contacts (par.2.5).

The PR020/K unit also features (only in combination with the protection relays fitted to the Emax series) the 'Load control' function. For further information on the 'Load control' function, as well as the settings necessary to use this protection, consult the user manual for the protection relays (PR112 and PR113).

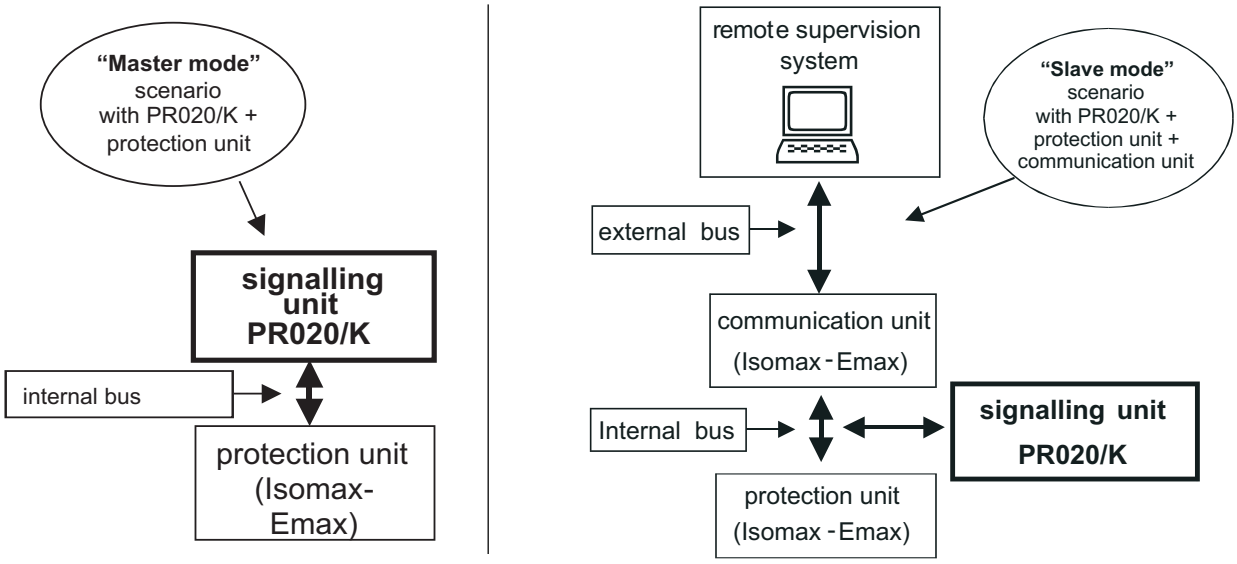
For the correct use and operation of protection units interfaced with the PR010/K unit, the following documents must be consulted;
- Kit sheet protection unit PR212/P (doc. n° RH0062)
- Kit sheet protection unit PR212/MP (doc. n° RH0063)
- Instruction manual protection unit PR112/P (doc. n° RH0288 for version IEC or RH0109 for version UL)
- Instruction manual protection unit PR113/P (doc. n° RH0288 for version IEC or RH0109 for version UL)
- ABB SACE Isomax technical catalogue
- ABB SACE Emax technical catalogue

1.2. Applicable scenarios

The following diagram shows the applicable scenarios and the relationship between:
- Protection unit (Isomax series or Emax)*
- PR020/K unit
- Communication unit (Isomax series or Emax)*

*: for Emax series, the protection unit contains an internal communication unit (when required).

Connections between various units, depending on the scenario (Master or Slave mode) are shown as indications only, the specific cabling must be carried out according to official ABB SACE documentation.



2. Technical characteristics

2.1. Electrical characteristics

Effective operation:	Maximum of 5s after power on
MTBF (MIL-HDBK-217E) expected:	15 years at 45°C

2.1.1. Auxiliary supply

Characteristics	PR020/K unit
Supply voltage	24 Vdc±20%
Maximum ripple	± 5%
Nominal Power	4.4 W @ 24 VDC

As the Vaux must be isolated from earth, it is necessary to use 'galvanically separate converters' conforming to IEC 60950 (UL1950) or equivalent [which guarantee a common mode current or leakage current (see IEC 478/1, CEI 22/3) not greater than 3.5mA], IEC 60364-41 and CEI 64-8.

2.2. Mechanical characteristics

Casing:	Polyamide plastic (no metal parts)
Degree of protection:	IP20
Dimensions:	95 x 53 x 112 mm (h x w x d)
Weight:	400 gr. (including 2 front connectors)

2.3. Environmental conditions

Operating environmental temperature:	-5 °C ... + 70 °C
Storage conditions:	-40 °C ... + 90 °C
Relative humidity:	5…90% (without condensation)
Atmospheric pressure:	1 bar, 0-2000m

2.4. Communication Bus

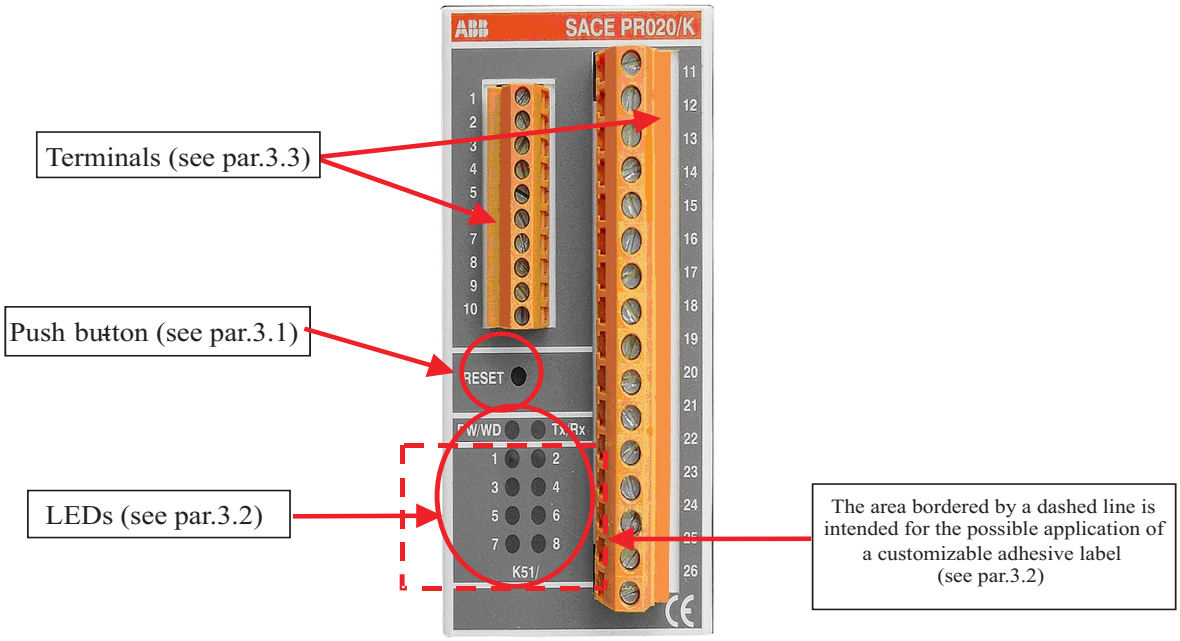
Exclusive ABB SACE communication bus (internal bus)

2.5. Internal relay characteristics

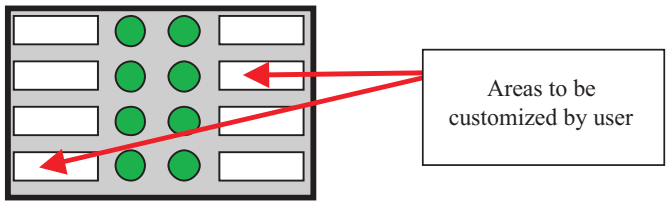
Type:	Monostable STDP
Maximum switching capacity:	100 W / 1250 VA (resistive load)
Maximum switching voltage:	130 Vdc / 250 Vac
Maximum switching current:	5 A
Breaking power (UL/CSA) @ 30 Vdc (resistive load) :	3.3 A
Breaking power (UL/CSA) @ 250 Vac (resistive load) :	5 A
Contact/coil insulation:	2000 V efficient (1 min. @50Hz)

3. User interface

The front of the unit consists of one push-button, ten LEDs, and two terminal boxes.



Should the user wish to assign a customized meaning to the LEDs, the customizable adhesive rating plate may be used (RE0433/001), supplied together with the SACE PR020/K unit.



3.1. Using the push-buttons

- Reset:

Press to reset the PR020/K hardware.

3.2. Optical signalling

Description of events signalled by the LEDs **K51/1**…**K51/8**

PR020/K Operating conditions			
	LED state		
Description of LEDs	Off	On	Flashing
K51/1 (green)	Contact K51/1 open	Contact K51/1 closed	--
K51/2 (green)	Contact K51/2 open	Contact K51/2 closed	--
K51/3 (green)	Contact K51/3 open	Contact K51/3 closed	--
K51/4 (green)	Contact K51/4 open	Contact K51/4 closed	--
K51/5 (green)	Contact K51/5 open	Contact K51/5 closed	--
K51/6 (green)	Contact K51/6 open	Contact K51/6 closed	--
K51/7 (green)	Contact K51/7 open	Contact K51/7 closed	--
K51/8 (green)	Contact K51/8 open	Contact K51/8 closed	--

Description of events signalled by the LEDs **PW/WD** and **TX/RX**

PR020/K Operating conditions		
Description of LEDs		Meaning
PW/WD	TX/RX	
GREEN	OFF	If PR020/K is Slave then there is no communication
GREEN	ON	Not contemplated
GREEN	4 flashes (*)	**Bus KO**
GREEN	3 flashes (*)	**Failure to identify** the protection unit
GREEN	2 flashes (*)	Indicates that the Dip-switch **K51 Dis/En** is in the ON position
GREEN	1 flash (*)	Indicates that the Dip-switch **TEST Dis/En** is in the ON position.
GREEN	BLINK	Operating Mode
RED	XX	WD hardware error
R/V 2 Hz	OFF	Programming Mode
R/V 2 Hz	ON	Programming successfully completed
R/V 2 Hz	flashing at 2 Hz	Programming failed
OFF	OFF	Unit off
OFF	ON	Not contemplated

Caption:
XX = don't care
BLINK = Flashing synchronized with activity of the internal bus (the LED is on for 1 ms for each message received or transmitted)
R/V 2 Hz = intermittent red/green lighting at 2 Hz.
(*) Each flash is equivalent to the corresponding LED lighting for 200 ms, with a repetition period of 2 s. The following priorities are introduced to handle cases in which more than one signal is active:

Signal	Priority
Bus KO	high priority
Missing identification	
K51 Dis/En	
Test Dis/En	low priority

- The LED test, consisting of simultaneously lighting all LEDs for 1s, takes place when the PR020/K unit is switched on; the LED status is subsequently linked to normal unit operation.
- Any LED state which does not conform with the above probably indicates a malfunction of the SACE PR020/K UNIT.
- The indications given in the above table are with Vaux present
- For further details of possible malfunction conditions see par.6.

3.3. Terminal block

Connections 1…26 inputs and outputs of PR020/K unit (see pars. 5.1 e 5.2).

4. Special functions

4.1. Reset

It is possible to reset the PR020/K unit by pressing the 'Reset' push-button situated on the front panel of the unit (see par. 3.1).
This type of reset restarts the Sw of the PR020/K unit (the data stored in the RAM are erased).

4.2. Reset signalling

"Reset signalling" causes the internal relays (K51/1…8) to be repositioned to resting conditions (contact open).

This reset may be carried out by:
- carrying out a reset (see par.4.1), if the applicable scenario is “PR020/K in Master mode” (see par.1.2).
- sending a “Trip Reset “ command from the remote supervision system.
- pressing the RESET push-button on the front of the unit, if the applicable scenario is “PR020/K in Slave mode” (see par.1.2), with Emax series protection unit (PR112 or PR113).

4.3. Self-test function

To carry out the self-test, dip-switch n°1 must be set to ON (see par. 5.3) and then the reset button pressed.
The self-test switches all 8 internal relays of the unit in succession, and activates the corresponding indicator LED K51/1…K51/8 (see par. 3.2).
The Tx/Rx LED lights with each switching, and once the self-test is finished will flash according to the indications listed in par. 3.2.
The self-test takes approx. 10 s, after which the SACE PR020/K unit automatically returns to normal operation.

NOTE The Self-test function is activated even if the dip-switch n°1 is ON, and if the PR020/K unit is subsequently switched off and back on again.

4.4. Funzione Stand-by

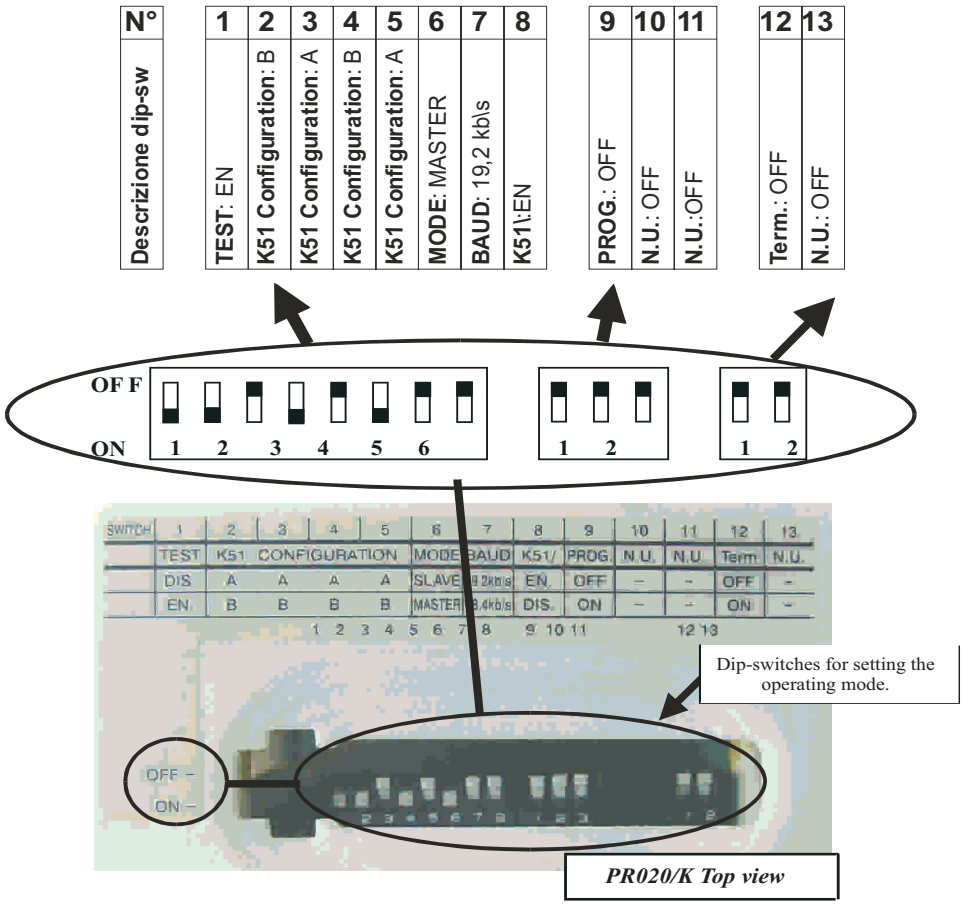
To select the Stand-by mode, the dip-switch n°8 must be set to ON (see par. 5.3) then the reset push-button pressed; in this operating mode the internal relays of the unit will not be switched (but the corresponding indicator LEDs K51/1…K51/8 will still light).
While operating in Stand-by mode, the Tx/Rx LED will flash according to the instructions listed in par. par. 3.2.
This function is useful when the protection unit is being tested (for example with PR010/T unit) and switching of the relays of the PR020/K unit is not desired.

N.B.: dip-switch reading is carried out at "power on" or after a hardware reset (pressing front "Reset" button) and is active after the start-up phase.

Dip-Switch N°	dip-switch description	Settable values	Note
1	**TEST**	OFF = DIS. (Self-test disabled) ON = EN. (Self-test enabled)	The "Self-test" function switches all 8 internal relays in succession. The Tx LED lights with each switching, and will flash once the self-test is finished according to the indications listed in par. 3.2. For normal operating mode, this dip-switch must be set to OFF.
2	**K51 Configuration**	OFF = A (Signal matched to event A) ON = B (Signal matched to event B)	Depending on the type of protection unit to which the PR020/K unit is connected, the signal of the event associated with switching of some contacts (K51) may be chosen between two alternatives (A or B). NOTE: For some protection units, an alternative which can be selected using the dip-switches is not provided. In this case the event associated with each contact is unique (defined by ABB SACE), and is independent of the position of the dip-switch (OFF or ON).
6	**MODE**	OFF = SLAVE ON = MASTER	Setting in Master mode is necessary when the PR020/K unit is combined with a protection unit without a communication unit (see "scenario PR020/K in Master mode" par.1.2). Setting in Slave mode is necessary when the PR020/K unit is connected to a protection unit and a communication unit (see "scenario PR020/K in Slave mode" par.1.2).
7	**BAUD**	OFF = 19.2 kbit/s ON = 38.4 kbit/s	The setting of the transmission speed must be equal to that of the connected protection unit (see par.5.4.1, 5.5.1, 5.6.1…).
8	**K51/**	OFF = EN. (standard mode) ON = DIS. (Stand-by mode)	Normal operating mode ensures that the K51 contacts switch when the conditions which normally cause switching exist (normal operating) and the corresponding indicator LED lights. Stand-by mode ensures that the K51 contacts do not switch under any circumstances, even under conditions which would normally cause switching (the indicator LEDs K51/1…K51/8 will still light). If set to ON (Stand-by) the unit is not able to carry out a self-test (performs the self-test by activating only the LEDs). For normal operation, this dip-switch must be set to Off.
9	**PROG.**	OFF = OFF (Operative Mode) ON = ON (Programming Mode)	For ABB SACE use only. For normal operating mode, set this dip-switch to OFF.
10	**N.U.**	OFF = - - ON = - -	Not used. For normal operating mode, set this dip-switch to OFF.
11	**N.U.**	OFF = - - ON = - -	Not used. For normal operating mode, set this dip-switch to OFF.
12	**Term.**	OFF = OFF (Terminal excluded) ON = ON (Terminal included)	Turn (ON) to terminate the internal bus with a resistance of 120Ω. The choice depends on the actual position of the PR020/K unit on the backbone of the communication system.
13	**N.U.**	OFF = - - ON = - -	Not used. For normal operating mode, set this dip-switch to OFF.

5.3.1. Example of dip-switch setting

Example of dip-switch setting for connecting the PR020/K unit.



5.3.2. Default settings

The PR020/K unit is supplied by ABB SACE with the following parameters pre-set:

Dip-switch N°	Description of dip-switch	Dip-switch position	Value set
1	TEST	OFF	DIS.
2	K51 CONFIGURATION		Mode A
3			
4			
5			
6	MODE		SLAVE
7	BAUD		19.2 kbit/s
8	K51/		EN.
9	PROG.		OFF
10	N.U.		--
11	N.U.		--
12	Term.		OFF
13	N.U.		--

5.3.3. Serial Number

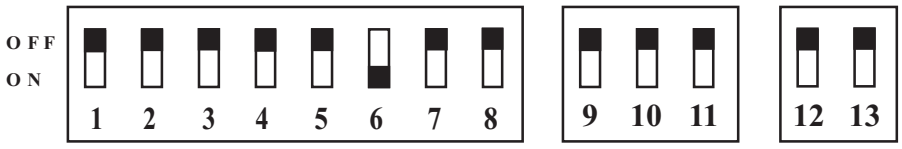
The Serial Number label is positioned on the left side, at the top.

5.4. SACE PR020/K with SACE PR112 unit (version “with key”)

5.4.1. Dip-switch settings

Dip-sw N°	Description of dip-switch	OFF	ON	Notes
1	TEST	DIS.	EN.	For normal operating mode, set this dip-switch to OFF.
2	K51 Configuration	--	--	Not used Set these dip-switches to OFF
3				
4				
5				
6	MODE	SLAVE	MASTER	Master if PR112/P + PR020/K. Slave if PR112/PD + PR020/K.
7	BAUD	19.2 kbit/s	38.4 kbit/s	Set 19.2 kbit/s
8	K51/	EN.	DIS.	For normal operating mode, set this dip-switch to OFF.
9	PROG.	OFF	ON	Set this dip-switch to OFF
10	N.U.	--	--	Not used Set these dip-switches to OFF
11	N.U.	--	--	
12	Term.	OFF	ON	See par. 5.3
13	N.U.	--	--	Not used Set this dip-switch to OFF

Example of dip-switch settings for connection of PR020/K unit with SACE PR112/P protection release



5.4.2. Signalling

The significance of signals (K51/1…K51/8) for protection release SACE PR112 is as follows:

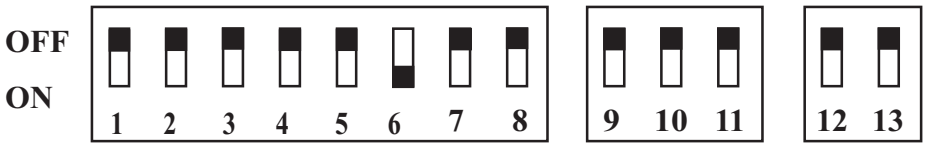
Contact	Terminal N° on PR020/K unit	Event which causes closing of relay
K51/1	11-dic	Protection L alarm or trip (overload)
K51/2	13-14	Protection S alarm or trip (selective short-circuit)
K51/3	15-16	Protection I tripped (instantaneous short-circuit)
K51/4	17-18	Protection G alarm or trip (earth fault)
K51/5	19-20	Internal Bus communication problem (bus KO)
K51/6	21-22	Internal overtemperature alarm or trip (T=85°C)
K51/7	23-24	Protection release –TRIP– trip alarm
K51/8	25-26	Pre-alarm function L (overload)

5.5. SACE PR020/K with SACE PR112 unit (version “without key”)

5.5.1. Dip-switch settings

Dip-sw N°	Description of dip-switch	OFF	ON	Note
1	TEST	DIS.	EN.	For normal operating mode, set this dip-switch to OFF.
2	K51/4 Configuration	A= Protection G alarm or trip	B = Pre-alarm function L	Functions (A or B) assigned to contact relay, to be selected with corresponding dip-switch
3	K51/5 Configuration	A= Bus KO	B = Overtemperature alarm or trip.	
4	K51 Configuration	--	--	Not used Set this dip-switch to OFF
5				
6	MODE	SLAVE	MASTER	Master if PR112/P + PR020/K. Slave if PR112/PD + PR020/K.
7	BAUD	19.2 kbit/s	38.4 kbit/s	Set 19.2 kbit/s
8	K51/	EN.	DIS.	For normal operating mode, set this dip-switch to OFF.
9	PROG.	OFF	ON	Set this dip-switch to OFF
10	N.U.	--	--	Not used Set these dip-switches to OFF
11	N.U.	--	--	
12	Term.	OFF	ON	See par. 5.3
13	N.U.	--	--	Not used Set this dip-switch to OFF

Example of dip-switch settings for connection of PR020/K unit with SACE PR112/P protection release.



In the example, the PR020/K unit has been set as follows:

- Self-test function disabled
- K51 configuration = A-A-A-A
- Master mode
- Baud rate = 19.2 Kb/s
- Stand-by Function not active
- Internal bus not terminated

5.5.2. Signalling

The significance of signals (K51/1…K51/8) for protection unit SACE PR112 is as follows:

Contact	Terminal N° on PR020/K unit	Event which causes closing of relay
K51/1	11-dic	Protection L alarm or trip (overload)
K51/2	13-14	Protection S alarm or trip (selective short-circuit)
K51/3	15-16	Protection I tripped (instantaneous short-circuit)
K51/4 *	17-18	A = Protection G alarm or trip (earth fault)
		B = Pre-alarm function L (overload)
K51/5 *	19-20	A = Internal Bus communication problem (bus KO)
		B = Internal overtemperature alarm or trip (T=85°C)
K51/6	21-22	Load check LC1
K51/7	23-24	Protection release –TRIP– trip alarm
K51/8	25-26	Load check LC2

"*"The reason for closing these contacts (K51/4 and K51/5) depends upon the configuration of the PR020/K unit, set via the dip-switch (signal event A or event B) (see par.5.3).

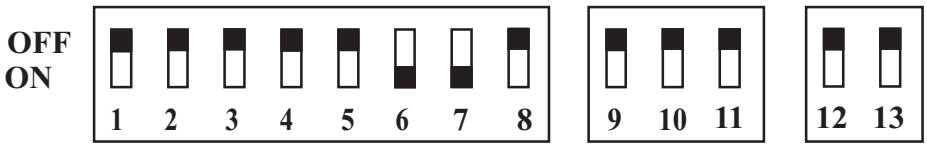
In the event of a trip due to a protection function not set in the signal settings (for example, a trip has occurred for "overtemperature" but the relay K51/5 was set to signal "communication problems on the internal bus"), only the relay K51/7 (protection release –TRIP– trip alarm) will be switched.

5.6. SACE PR020/K with SACE PR113 unit

5.6.1. Dip-switch settings

Dip-sw N°	Description of dip-switch	OFF	ON	Note
1	TEST	DIS.	EN.	For normal operating mode, set this dip-switch to OFF.
2	K51/1 Configuration	A = Protection L alarm or trip	B = Pre-alarm function L	**if dip-switch N°5 = Off** Note [1]: Functions (A or B) assigned to relay contact, to be selected with corresponding dip-switch
3	K51/4 Configuration	A = Protection G alarm or trip	B = Minimum voltage coil (MT) energized	
4	K51/5 Configuration	A = Bus KO	B = Overtemperature alarm or trip	
5	K51/1…K51/8 Configuration	(See note [1])	Bus KO (See note [2])	**if dip-switch N°5 = On** Note [2]: The functions assigned to contacts (K51/1…K51/4 and K51/6…K51/8) are those directly defined by the user on PR113 while contact K51/5 is associated with the signalling of "bus KO"
6	MODE	SLAVE	MASTER	Master if PR113/P + PR020/K. Slave if PR113/PD + PR020/K.
7	BAUD	19.2 kit/s	38.4 kbit/s	Set 38.4 kbit/s
8	K51/	EN.	DIS.	For normal operating mode, set this dip-switch to OFF.
9	PROG.	OFF	ON	Set this dip-switch to OFF
10	N.U.	--	--	Not used Set these dip-switches to OFF
11	N.U.	--	--	
12	Term.	OFF	ON	See par. 5.3
13	N.U.	--	--	Not used Set this dip-switch to OFF

Example of dip-switch settings for connection of PR020/K unit with SACE PR113/P protection release.



In the example, the PR020/K unit has been set as follows:

- Self-test function disabled
- K51 configuration = A-A-A-A
- Master mode
- Baud rate = 38.4 Kb/s
- Stand-by Function not active
- Internal bus not terminated

5.6.2. Signalling

The significance of signals (K51/1…K51/8) for the SACE PR113 protection release is as follows:

Contact	Terminal N° on PR020/K unit	Event which causes closing of relay	Setting of Dip-switch n°5 [3]
K51/1*	11-dic	A = Protection L alarm or trip (overload)	OFF
		B = Pre-alarm function L (overload)	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/2	13-14	Protection S alarm or trip (selective short-circuit)	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/3	15-16	Protection I tripped (instantaneous short-circuit)	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/4*	17-18	A = Protection G alarm or trip (earth fault)	OFF
		B = Minimum voltage coil (MT) energized	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/5*	19-20	A = Internal Bus communication problem (bus KO)	OFF
		B = overtemperature alarm or trip (T=85°C)	OFF
		Internal Bus communication problem (bus KO) (see note [3])	ON
K51/6	21-22	Load check LC1	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/7	23-24	Protection release –TRIP– trip alarm	OFF
		Configured by user on PR113 unit (see note [3])	ON
K51/8	25-26	Load check LC2	OFF
		Configured by user on PR113 unit (see note [3])	ON

"*"The reason for the closing of these contacts (K51/1, K51/4 and K51/5) depends upon the configuration (A or B), set via the dip-switch of the PR020/K unit, only if dip-sw N°5 is set to OFF (see par.5.6.1).

[3] In the case of dip-sw N°5 set to ON, all contacts (K51/1…K51/8) are exclusively associated with the function set on the PR113 unit by the user, except contact K51/5 which shows 'Internal Bus communication problem (bus KO)'.

In the event of a trip due to a protection function not set in the signal settings (for example, a trip has occurred for "protection G" but the relay K51/4 was set to signal "minimum voltage coil (MT) energized"), only the relay K51/7 (protection release –TRIP– trip alarm) will be switched.

5.6.3. Connection of 3 SACE PR020/K units with SACE PR113/P

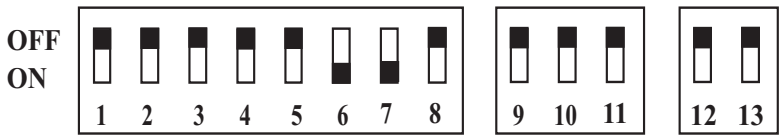
It is possible to connect up to a maximum of three SACE PR020/K units with the PR113/P unit (see par. 5.9.2).
The only condition being that one PR020/K unit must be configured as Master, with the other(s) configured as Slave(s).
In this way it is possible to activate up to (7 + 8 + 3 =) 18 contacts without potential (K51/1, K51/2,…), plus 6 replicated contacts (see Emax manual).

5.7. SACE PR020/K with SACE PR212/P unit

5.7.1. Dip-switch settings

Dip-sw N°	Description of dip-switch	OFF	ON	Note
1	TEST	DIS.	EN.	For normal operating mode, set this dip-switch to OFF.
2	K51 Configuration	--	--	Not used Set these dip-switches to OFF
3				
4				
5				
6	MODE	SLAVE	MASTER	Master if PR212/P + PR020/K Slave if PR212/P + PR212/D-L (or PR212/D-M) + PR020/K
7	BAUD	19.2 kbit/s	38.4 kbit/s	Set 38.4 kbit/s
8	K51/	EN.	DIS.	For normal operating mode, set this dip-switch to OFF.
9	PROG.	OFF	ON	Set this dip-switch to OFF
10	N.U.	--	--	Not used Set these dip-switches to OFF
11	N.U.	--	--	
12	Term.	OFF	ON	See par. 5.3
13	N.U.	--	--	Not used Set these dip-switches to OFF

Example of dip-switch settings for connection of PR020/K with SACE PR212/P protection release.



In the example, the PR020/K unit has been set as follows:
- Self-test function disabled
- K51 configuration = A-A-A-A
- Master mode
- Baud rate = 38.4 Kb/s
- Stand-by Function not active
- Internal bus not terminated

5.7.2. Signalling

The significance of signals (K51/1…K51/8) for the SACE PR212/P protection unit is as follows:

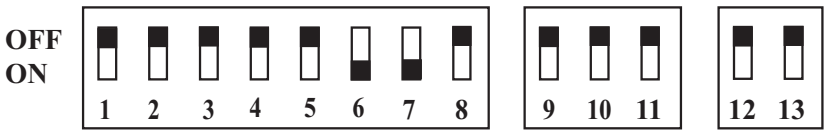
Contact	Terminal N° on PR020/K unit	Event which causes closing of relay
K51/1	11-dic	Protection L alarm or trip (overload)
K51/2	13-14	Protection S alarm or trip (selective short-circuit)
K51/3	15-16	Protection I tripped (instantaneous short-circuit)
K51/4	17-18	Protection G alarm or trip (earth fault)
K51/5	19-20	Internal Bus communication problem (bus KO)
K51/6	21-22	Protection release –TRIP– trip alarm
K51/7	23-24	Protection release –TRIP– trip alarm
K51/8	25-26	Pre-alarm function L (overload)

5.8. SACE PR020/K with SACE PR212/MP unit

5.8.1. Dip-switch settings

N° Dip-Sw	Description of dip-switch	OFF	ON	Note
1	TEST	DIS.	EN.	For normal operating mode, set this dip-switch to OFF.
2	K51/4 Configuration	A = Protection U alarm or trip	B = Protection WC alarm or trip	Functions (A or B) assigned to relay contact, to be selected with corresponding dip-switch
3	K51/6 Configuration	A = Protection PTC alarm or trip	B = Status of generic input (G.P.)	
4	K51/8 Configuration	A = Pre-alarm function L	B = Backup protection	
5	K51 Configuration	--	--	Not used Set this dip-switch to OFF
6	MODE	SLAVE	MASTER	Set Master
7	BAUD	19.2 kbit/s	38.4 kbit/s	Set 38.4 kbit/s
8	K51/	EN.	DIS.	For normal operating mode, set this dip-switch to OFF.
9	PROG.	OFF	ON	Set this dip-switch to OFF
10	N.U.	--	--	Not used Set these dip-switches to OFF
11	N.U.	--	--	
12	Term.	OFF	ON	See par. 5.3
13	N.U.	--	--	Not used Set this dip-switch to OFF

Example of dip-switch settings for connection of PR020/K unit with SACE PR212/MP protection release.



In the example, the PR020/K unit has been set as follows:

- Self-test function disabled
- K51 configuration = A-A-A-A
- Master mode
- Baud rate = 38.4 Kb/s
- Stand-by Function not active
- Internal bus not terminated

5.8.2. Signalling

The significance of signals (K51/1…K51/8) for the SACE PR212/MP protection release is as follows:

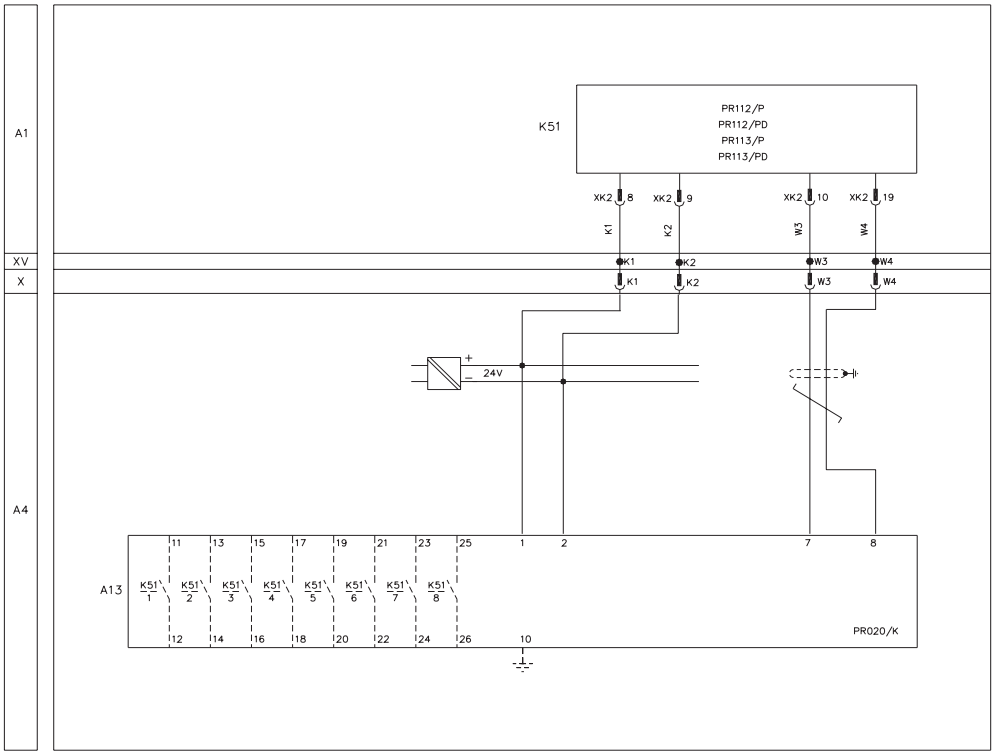
Contact	Terminal N° on PR020/K unit	Event which causes closing of relay
K51/1	11-dic	Protection L alarm or trip (overload)
K51/2	13-14	Protection R alarm or trip (rotor blocked)
K51/3	15-16	Protection I tripped (instantaneous short-circuit)
K51/4 *	17-18	A = Protection U alarm or trip (loss of phase)
		B = WC alarm or trip (contacts stuck)
K51/5	19-20	Internal Bus communication problem (bus KO)
K51/6 *	21-22	A = PTC alarm or trip (motor overtemperature)
		B = Status of generic input G.P. (activated if G.P. = 1)
K51/7	23-24	Protection release –TRIP– trip alarm
K51/8 *	25-26	A = Pre-alarm function L (overload)
		B = Backup protection alarm

"*"The reason for closing these contacts (K51/4 ,K51/6 and K51/8) depends upon the configuration (event A or event B) of the PR020/K unit set via the dip-switch, (see par.5.3).

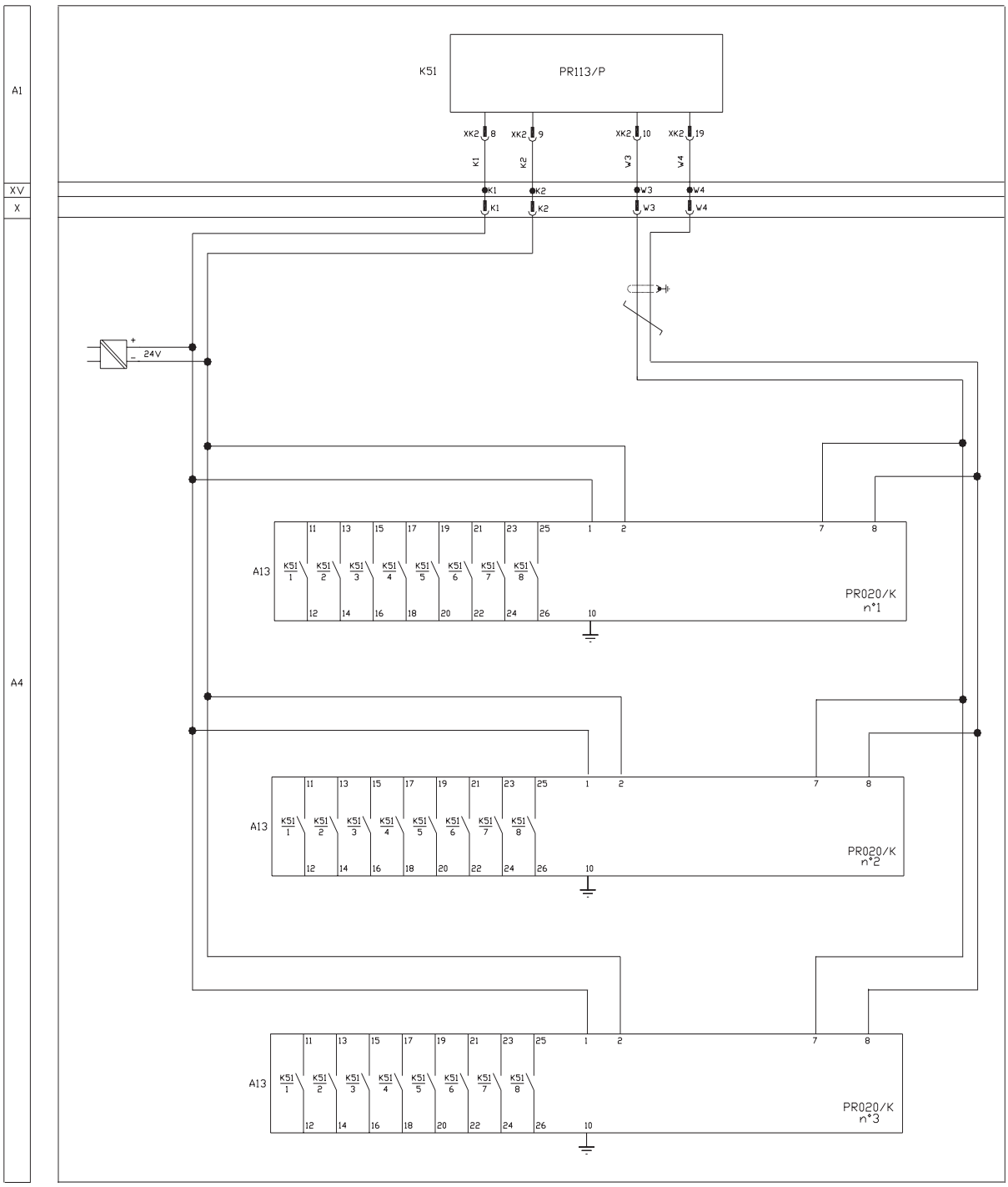
In the event of a trip due to a protection function not set in the signal settings (for example, a trip has occurred for "contacts stuck (WC)" but the relay K51/4 was set to signal "Protection U alarm or trip"), only the relay K51/7 (protection release –TRIP– trip alarm) will be switched.

5.9. Electrical diagrams

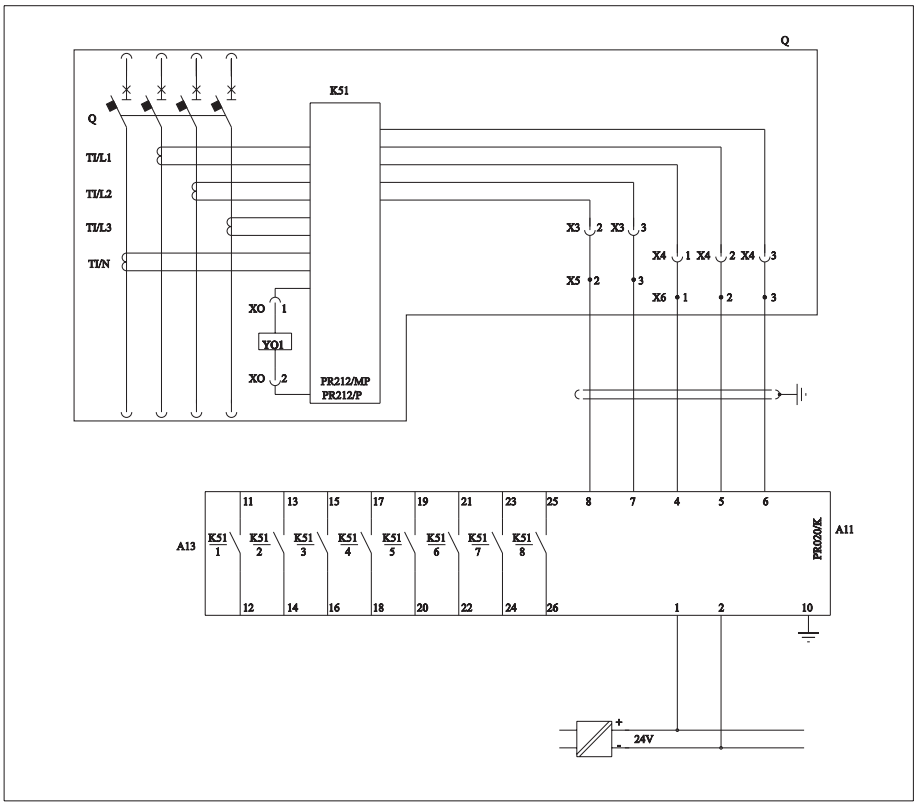
5.9.1. PR112 or PR113 + PR020/K



5.9.2. PR113/P + 3 PR020/K units

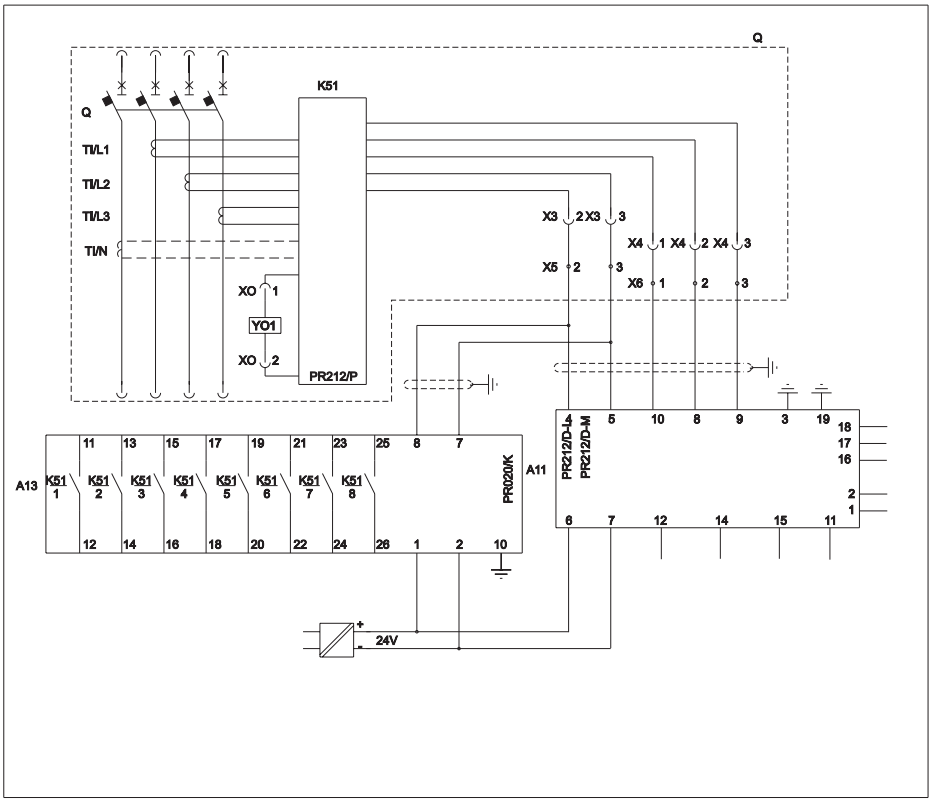


5.9.3. PR212/P or PR212/MP + PR020/K



NOTE: The PR212/MP is available only for three-pole circuit-breakers

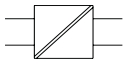
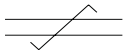
5.9.4. PR212/P + PR212/D-L or PR212/D–M + PR020/K



Electrical diagram legend

A11 = Communication unit PR212/D-L or PR212/D-M for connection with a remote supervision system.
A13 = Signalling unit PR020/K
K51 = Protection unit PR212/P, PR212/MP, PR112/P, PR112/PD, PR113/P and PR113/PD.
K51/1...8 = Internal relays of signalling unit PR020/K
X3-X4 = Connectors for auxiliary circuits of protection unit PR212/P or PR212/MP
X = Delivery connector for auxiliary circuits of the withdrawable circuit-breaker
XV = Delivery terminal boxes for auxiliary circuits for fixed circuit-breaker

Graphicals symbols for electrical diagram (617 IEC standards)

SEGNO SYMBOL	IEC REF. NUMBER	LEGENDA CAPTION
	02-15-01	-TERRA (SEGNO GENERALE) -EARTH, GROUND (GENERAL SYMBOL)
	02-17-06 02-17-07	-CONVERTITORE SEPARATO GALVANICAMENTE -CONVERTER WITH GALVANIC SEPARATOR
	03-01-07 03-01-09	-CONDUTTORI IN CAVO SCHERMATO (ESEMPIO: DUE CONDUTTORI) -CONDUCTORS IN A SCREENED CABLE, TWO CONDUCTORS SHOWN
	03-01-08	-CONDUTTORI O CAVI CORDATI (ESEMPIO: DUE CON- DUTTORI) -TWISTED CONDUCTORS, TWO CONDUCTORS SHOWN
	03-02-02	-TERMINALE O MORSETTO -TERMINAL
	03-02-01	-CONNESSIONE DI CONDUTTORI -CONNECTION OF CONDUCTORS
	03-03-05	-PRESA E SPINA (FEMMINA E MASCHIO) -PLUG AND SOCKET (MALE AND FEMALE)
	07-02-01	-CONTATTO DI CHIUSURA -MAKE CONTACT

6. Troubleshooting

The following table details a range of typical operational situations, useful in the understanding and resolution of hypothetical faults and malfunctions.

Note:

- Before consulting the following table, check the LEDs on the front panel of the PR020/K unit for several seconds. (wait until the end of the start up phase if the unit has just been switched on).
- FN indicates normal operating.

N°	Situation	Possible causes	Suggestions
1	Relays do not switch, even in presence of conditions required for switching (for example an overload with protection function L)	1. The PR020/K unit is in "Stand-by" operating mode 2. The unit has not been reset.	1. Set the dip-sw "K51/ " to "EN.", then press the "Reset" push-button on the front panel of the PR020/K unit. 2. Reset.
2	The unit does not update signals.	1. The unit has not been reset. 2. Internal Bus communication is interrupted (see par. 3.2.)	1. Press the reset push-button on the front panel of the unit. 2. Check connections
3	The signalling cannot be reset after a protection release trip, despite pressing the reset push-button.	The connected protection unit is a PR112 or PR113, and the presence of the PR020/K unit has not been set up.	• Set the PR020/K unit to On in the menu of the protection unit. • Press the RESET push-button on the front panel of the PR112 or PR113. • Send the "Trip reset" command from the remote supervision system.
4	Flashing "Tx/Rx" and/or switching relay K51/5 (bus KO) discontinued.	1. Bus conflict (2 masters) 2. Defective connection	1. Set the "MODE" dip-sw to "SLAVE" 2. Check connections
5	The "Tx/Rx" LED flashes once or more (from 1 to 4 times) with a duration of 200 ms and a repetition period of 2s (see par. 3.2.)	1. Unit with "Self-test" function enabled 2. Unit PR020/K in Stand-by mode. 3. Connected protection unit not recognized. 4. Communication problems (bus KO)	1. FN 2. FN 3. Remove Vaux from PR020/K unit and from the protection unit, then re-power the two units simultaneously 4. Check the connections, the communication rate setting ("BAUD" dip-switch) and the mode ("MODE" dip-switch)
6	The LED "Tx/Rx" is off.	1. Wiring error. 2. Aux voltage not present. 3. PR020/K in programming mode	1. Check connections 2. Restore supply voltage. 3. Check the "PROG." dip-switch
7	The "PW/WD" LED is steadily lit red	Anomalous situation.	Contact ABB SACE
8	The "PW/WD" LED is flashing red	PR020/K in programming mode	Check the "PROG." dip-switch

6.1. In case of fault

If the suggestions provided in the table do not solve the problems, and/or if you suspect that the PR020/K unit is faulty, malfunctioning or has generated unexpected commands, we recommend that you scrupulously follow the instructions below:

- Prepare a brief description of the problem (when did it occur? how many times? can the event be reproduced? how? etc.). Note the type of load connected to the signalling unit (lamps, signalling relays, remote switches, contactors, sirens, etc.), the serial number of the unit (see par.5.3.3), etc.
- Send all of the information gathered, complete with the application circuit diagram, to the nearest ABB SACE technical support.

The more complete and accurate the information supplied to the ABB technical support, the easier it will be to analyze the problem encountered, thus permitting the client to receive prompt and accurate service.

Head Office: Via Baioni, 35 - 24123 Bergamo - Italy - Tel.: +39 (0) 35 395111 - Telex: 301627 ABBSAC I - Telefax: +39 (0) 35 395306-395433