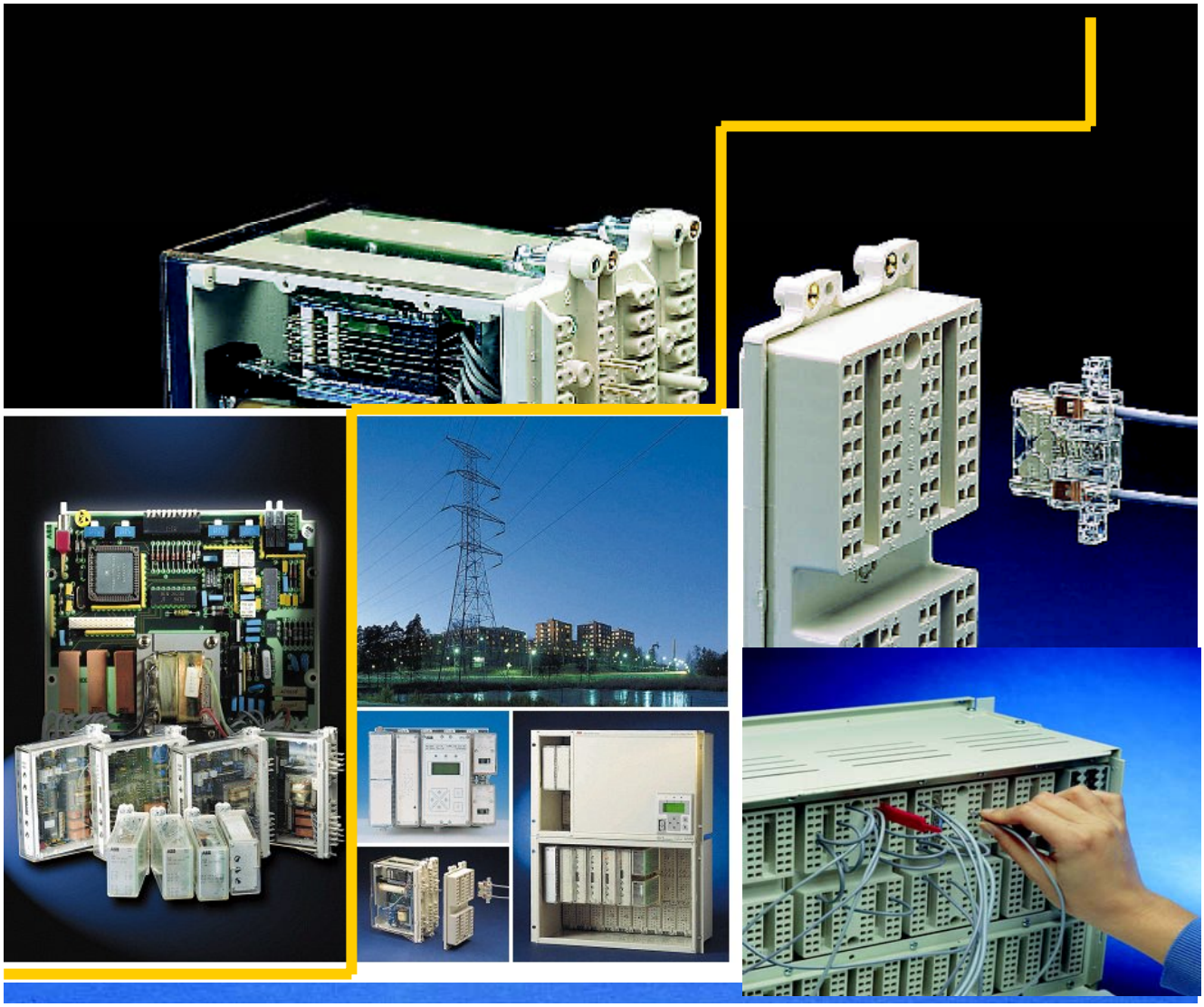
Mounting System for Relay and Control Panels

Builder's Guide - COMBIFLEX®

1MRK 509 075-MEN Rev. D April 2006



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Manufacturer:

ABB Power Technologies AB
Substation Automation
SE-721 59 Västerås
Sweden
Telephone: +46 (0) 21 34 20 00
Facsimile: +46 (0) 21 14 69 18
www.abb.com/substationautomation

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Chapter 1 Introduction

About this chapter
This chapter introduces the user to the economic and technical advantages of the modular COMBIFLEX® plug-in relay system.

The economical and technical advantages of the modular COMBIFLEX® plug-in relay system.

The packaging details of a modular plug-in relay system having a large number of auxiliary components and accessories, can significantly affect the cost in the following cases.

1. **Initial cost**
    a. Engineering cost
    b. Allocated building cost
    c. Installation cost
        1) Factory/panel builder's cost
        2) Field installation cost
        3) Commissioning cost

2. **After installation cost**

    a. Flexibility and adaptability to field modification and expansion
    b. Adaptability for accepting new concepts and state-of-the-art solutions in existing packages.
    c. Maintenance and replacement cost
    d. Spare parts inventory

This handbook is designed to guide the user how to use the COMBIFLEX® system and keeping all costs to a minimum while providing a quality of design and workmanship, which assure a low life cycle cost.
The COMBIFLEX modular system, one of the most flexible systems to engineer, assembly, test, maintain and expand your systems.
It is a well proven modular system, and it has been in service, throughout the world in more than 35 years and has given the users a system low life cycle cost.

Some customers throughout the world using COMBIFLEX

- SCECO, Saudi Arabia
- EGAT, Thailand
- ENEL, Italy
- ESKOM, South Africa
- PLEM, Netherlands
- Ministry of Railways, China
- Tavanir, Iran
- Transener, Argentina
- EdF, France
- Abu Dhabi
- CNMIEC, China
- Fynsverket, Denmark
- Hydro Quebec, Canada
- TVA, USA
- ICE, Costa Rica

Etc, Etc

- Swedish State Power Board
- NPC, Philippines
- Endesa, Chile
- Ontario Hydro, Canada
- Furnas, Brasil
- Eletrosul, Brazil
- BPA, USA
- DKW, Austria
- WAPDA, Pakistan
- ENHER, Spain
- CFE, Mexico
- Stockholm Energy, Sweden
- Enelven, Venezuela
- EEA, Egypt
- Statnett, Norway

Etc, Etc

Advantages of the COMBIFLEX system

- World-wide acceptance; >35 years, >8 million modules delivered
- Complete and flexible system
- Efficient engineering – new CAD tools
- Wide application range – Power & Industry
  – Suitable for replacement, retrofit, extensions and new systems
- Well proven and safe secondary injection testing by means of the COMBITEST system
- Supplementary to other ABB product series as well as to other makes
- CE-tested and certified to the new European standards

Standard Relay Modules and Protection Assemblies (Examples)

FUNCTION	RELAY MODULE (RX)	PROTECTION (Relay assembly, RA)
Overcurrent	RXIDK 2H, RXHL4xx	RAIDK,RAHL
Over/Undervoltage	RXEDK 2H, RXEDA 1	RAEDK, RAEDA
Thermal overload	RXVK 2H, RXHL4xx	RAVK, RAHL
Directional current	RXPDK 21H	RAPDK
Directional E/F	RXPDK 22H, RXHL42x	RAPDK, RAHL
Frequency	RXFK 2H	RAFK
V/Hz overexcitation	RXLK 2H	RALK
Impedance and voltage restraint o/c	RXZK 21H & 22H RXISK 2H	RAZK, RAISK
Trip Relays	RXMS 1 RXMH 2/RXMVB 2 etc	Trip unit

Generator Station Protection (Examples)

FUNCTION	PROTECTION	COMMENT	ANSI
100% stator E/F	RAGEK		59N/27N
Underexcitation I	RAGPK		40
Underexcitation II	RAPDK	RXPDK 21H	40
Rotor E/F	RAHL	+ Injection unit RXTTE 4	
Rotor E/F I	RAPDK	+ Injection unit RXTTE 4	64R - DC side
Negative sequence Overcurrent	RAIIK		46
Diode failure	RAIDK	RXIDK 2H standard	
Dead machine protection	RAGIK		50/27
Reverse power	RAPPK		32
Stator Differential	RADSC RADHA		87G
Block Differential	RADSB		87T & TG
Turn Differential	RAIDK or RAEDK		59N or 50N
Turn Differential	RAIG/RAEG		
Restricted E/F	RADHD RAPDK	High impedance E/F Active E/F current	87 N 87 N
Selective E/F	RAIG	Sensitive E/F diff.	87 N
Bearing current	RARIC	0,4 – 1 A	

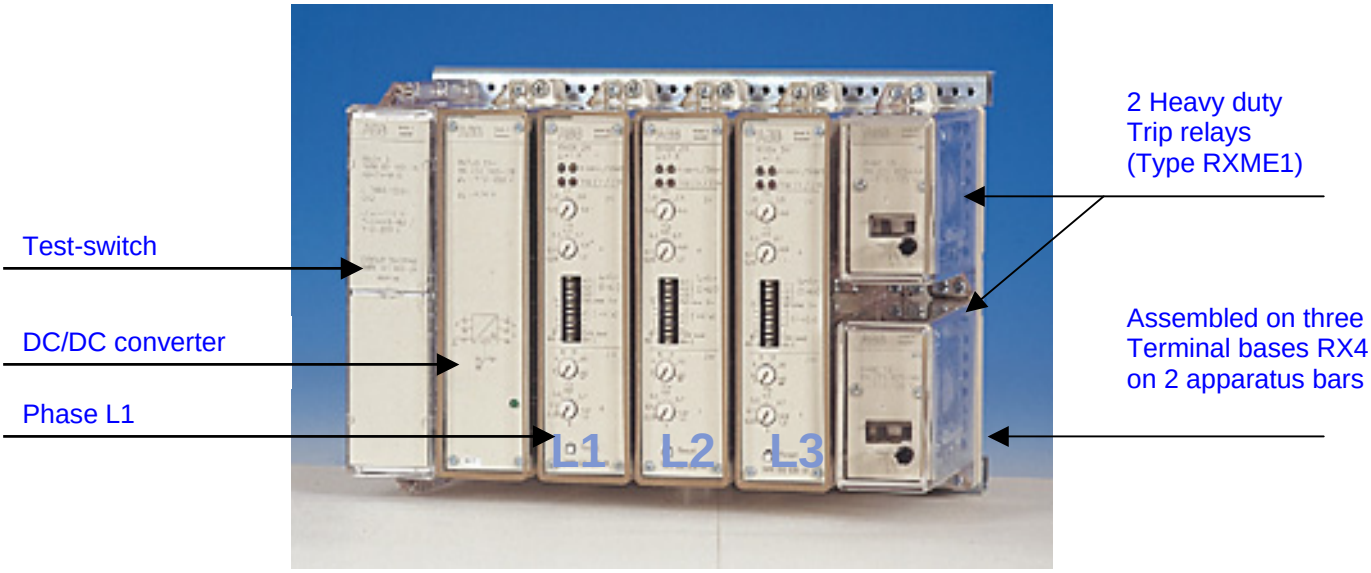
Transformer Protection Modules (Examples)

FUNCTION	RELAY (RX)	PROTECTION (RA)	ANSI
Overexcitation V/Hz	RXLK 2H	RALK	24
Overcurrent	RXIDK 2H	RAIDK	50/51
Earth fault o/c	RXIDK 2H	RAIDK	50N/51N
Directional o/c e/f	RXPDK 2H	RAPDK	67N
Neutral point voltage	RXEDK 2H	RAEDK	59N
Thermal overload	RXVK 2H	RAVK	49
Impedance	RXZK / RXISK	RAZK / RAISK	21/51V
Overvoltage	RXEDK 2H	RAEDK	59
Directional overcurrent	RXPDK 21H	RAPDK	67

Transformer Protection (relay assemblies) (Examples)

FUNCTION	PROTECTION	ANSI
Transformer-differential 2 or 3 windings up to six 3-ph inputs	RADSB	87
Auto-transformer Differential relay	RADHA RADSC	87
Restricted Earth fault differential	RADHD RAIG	87N
Earth fault o/c with 2nd harmonic blocking	RAISB	51N

Modular relays based on single phase measurements
Example - the RAIDK overcurrent relay – *2H platform



The relay assemblies can be customized to fit any customer installation requirement regarding e.g. test switch and special heavy duty trip relay outputs.

Multi-phase and multi-function modular products
*4 platform series

- **Compact**
- **Four analogue inputs**
- **Two setting groups**
- **Easy to handle HMI**
- **DC/DC converter 24-300 V input**
- **Two opto-coupled binary inputs**
- **Five outputs suitable for direct tripping**
- **Service values in primary values**
- **Memory for trip values**
- **Test via the HMI**
- **Optional I/O module, 4 inputs and 4 outputs**
- **Self supervision**
- **Optional Test Swich RTXP**
- **Optional heavy duty trip relays**

Accessories and Tools

In general screws for fixing mounting accessories are not included with the delivery of parts.

Following screws are included in delivery of the parts

Part	Assembly to	Screw type
RTXP Text switch	Rack, casing, …	ST 3,5 x 13 (Torx 15*)
RTXK, RTXI Current connectors	Terminal base RX1……	ST 2,2 x 9,5 (Phillips no 2)
RXZ 1….DIN-rail adapter kit	Parts together	ST 3,5 x 13 (Torx 15*)
RXZ 1….DIN-rail adapter kit	Parts together	ST 3,5 x 9,5(Torx 15*)
		* may in certain cases be Torx 10

Recommended screws in other cases

Part A to be fixed to	Part B	Screw type
RX….Terminal bases(all sizes)	Racks, casings, apparatus bars…..	ST 3,5 x 13
RTXE, RTXV Component blocks	RX1… Terminal base	ST 2,2 x 9,5
RTXC Connector	Any	ST 3,5 x 9,5
RTXG Connector	Any	ST 3,5 x 16
RHGT Rack	Cubicle 19" frame	M6
RHGP Casing	Panel	M4
RXZ 21, 41 Panel base	Panel, wall	ST 3,5 x 9,5
RHGS Casing	Panel, wall, 19" frame	Mounting kit to choose
RHGX Casing	Panel	Monting kit incl

Recommended tools
Screw drivers Torx (10), 15, (20), 25, (30)
Screw drivers Phillips no 1 and no 2, extra long
Combiflex Crimping tool for attaching terminal sockets to leads

Product Overview

Most of the products below can be found on http://www.abb.com/substationautomation and under the subheading Transmission products/ COMBIFLEX

Plug-in Modules and Relays

Type	Designation	Application	More details
			Catalogue
RXBA	Fuse supervison relay	Blocking of operation of other relays	1MRK508019-BEN
RXCLK	Current relay	Pilot-wire supervision for RADHL	NA
RXDHL	Differential relay	Measuring relay in RADHL	1MRK507004-BEN
RXDSB	Differential relay	Measuring relay in RADSB	1MRK504002-BEN
RXDSC	Differential relay	Measuring relay in RADSC	1MRK509016-BEN
RXEDA	Time-voltage relay	Over-under voltage, AC and DC, 1 or 3ph	1MRK509044-BEN
RXEDK	Time-voltage relay	Measuring relay in RAEDK, filtering	1MRK509004-BEN
RXEEB	Voltage relay	Sensitive measuring relay, 0,1 - 12 VDC	1MRK508018-BEN
RXEG	Voltage relay	Measuring relay in RAEG and other	NA
RXEM	Supervision relay	Voltage and breaker coil supervision	1MRK508024-BEN
RXETB	Fuse supervison relay	Detection of 1 or 2ph faults, time delayed op.	1MRK508019-BEN
RXFK	Time-frequency relay	Measuring relay in RAFK	1MRK509009-BEN
RXIB	Current relay	Measuring relay in RAICA and other	1MRK508018-BEN
RXID	Current relay	Measuring relay in RADHA, RADHD	NA
RXIDG	Time-current relay	Sensitive eart-fault relay in RAIDG	1MRK509002-BEN
RXIDK	Time-current relay	Measuring relay in RAIDK and other	1MRK509002-BEN
RXIG	Current relay	Measuring relay in RAIG and other	1MRK509010-BEN
RXIIK	Negative sequence current relay	Measuring relay in RAIIK	1MRK509045-BEN
RXIK	Current relay	Sensitive measuring relay, 0,5-2 mA, ACDC	1MRK508018-BEN
RXISB	Harmonic restraint current relay	Measuring relay in RAISB	1MRK504003-BEN
RXISK	Voltage restraint current relay	Measuring relay in RAISK	1MRK509033-BEN
RXKA	Time relay	On- and off-delay, 0,1 - 320 sec	1MRK508005-BEN
RXKL	Time relay	On-delay 30 ms to 99 h, AC or DC	1MRK508002-BEN
RXKM	Time relay	On- and off-delay, 30 ms - 99 h, integration	1MRK508002-BEN
RXLK	Volt per Hz relay	Measuring relay in RALK	1MRK509008-BEN
RXMA	Auxiliary relay	Medium duty contacts	1MRK508015-BEN
RXMB	Auxiliary relay	Medium duty contacts	1MRK508006-BEN
RXMC	Auxiliary relay	Medium duty contacts	1MRK508006-BEN
RXMD	Latching relay	Medium duty contacts	1MRK508017-BEN
RXME	Auxiliary relay	Heavy duty contacts	1MRK508015-BEN
RXMH	Auxiliary relay	Heavy duty contacts	1MRK508015-BEN
RXMM	Auxiliary relay	Medium duty contacts	1MRK508015-BEN
RXMS	Auxiliary relay	Fast operation	1MRK508015-BEN
RXMT	Auxiliary relay	Fast operation	1MRK508015-BEN
RXMVB	Latching relay	Heavy duty contacts	1MRK508016-BEN
RXNAA	Measuring relay	Measuring relay in RASC	1MRK510010-BEN
RXNAB	Measuring relay	Measuring relay in RASC	1MRK510010-BEN
RXNAC	Measuring relay	Measuring relay in RASC	1MRK510010-BEN
RXOTB	Voltage relay	Fast (1-5 ms), 1 and 3 ph undervoltage	NA
RXPDK	Directional current relay	Measuring relay in RAPDK	1MRK509007-BEN
RXPG	Transient current relay	Sensitive earth fault detection	1MRK509012-BEN
RXPPK	Sensitive power relay	Measuring relay in RAPPK	1MRK509042-BEN
RXSF	Signal relay	Flag indication	1MRK508015-BEN
RXSGA	Signal relay	Led indication, used in RADSB	NA
RXTBEA	Filter unit		NA
RXTBIC	Filter unit		NA
RXTCA	Capacitor unit		NA
RXTCB	Capacitor unit	Capacitors and resistors	1MRK513017-BEN
RXTCC	Capacitor unit	1 - 4 capacitors, values open	1MRK513017-BEN
RXTCD	Capacitor unit	Voltage supply where there is no battery	1MRK513021-BEN
RXTFB	Filter unit	Included in RARIC	NA
RXTLA	Rectifier unit	AC to DC conversion	1MRK513017-BEN
RXTMA	Resistor unit	With fixed resistances, open values	1MRK513017-BEN
RXTMB	Resistor unit	With potentiometer, open values	1MRK513017-BEN
RXTNS	Selector switch unit	Control	1MRK513016-BEN
RXTNT	Push button unit	Control	1MRK513016-BEN
RXTTA	Transformer unit	RXTTA 2 is used with RXOTB	NA
RXTTE	Injection unit	Used with rotor e-f protection	1MRK502003-BEN
RXVK	Thermal current relay	Measuring relay in RAVK	1MRK509003-BEN
RXZK	Impedance relay	Measuring relay in RAZK	1MRK509006-BEN

Accessories

Type	Designation	Application/features	More techn. info.
ILDD	Shaft current transformer	RARIC	1MRK502011-BEN
RHGP	Casing	Flush mounting small sizes relaysand RTXP	1MRK513003-BEN
RHGS	Casing	6U x 19" mounting	1MRK513003-BEN
RHGT	Rack	4u x 19" mounting	1MRK513003-BEN
RHGX	Casing	Flush or semi-flush, 4U x 19"(60C)	1MRK513003-BEN
RMXE	Auiliary relay	As RXME 1, but screw connection	NA
RQ 04	Terminal base	Size 4U x 2C	NA
RQBA	Diode unit	Extension of REB100 and RADSS	NA
RTOE	Optical connector	For PCB mounting	NA
RTQTB	Transformer unit	RADSB, RADSC and phased-out protn.	NA
RTXB	Trip-block plug	COMBITEST	1MRK512001-BEN
RTXC	Connector	Branch and cross connection	1MRK513003-BEN
RTXCB	Connector	Branch and cross connection	1MRK513003-BEN
RTXD	Extractor	Disconnection of Combiflex socket leads	1MRK513003-BEN
RTXE	Component block	Resistor, diode, varistor	1MRK512001-BEN
RTXF	Block-plug handle	COMBITEST	1MRK512001-BEN
RTXG	Connector	Fast connection-disconn. of multiple leads	1MRK513003-BEN
RTXH	Test-plug handle	COMBITEST	1MRK512001-BEN
RTXI	Shunt connector	Connector current circuits (DC)	1MRK513003-BEN
RTXK	Short-circuiting connector	Connector current circuits (AC)	1MRK513003-BEN
RTXM	Ammeter test-plug	COMBITEST	1MRK512001-BEN
RTXO	Optical connector	For PCB mounting	NA
RTXP	Test switch	COMBITEST	1MRK512001-BEN
RTXR	Multi-pole connector	For PCB mounting	NA
RTXRB	Multi-pole connector	For PCB mounting	NA
RTXV	Control unit	Pick-up voltage control of aux. Relays	1MRK513007-BEN
RX 1…	Terminal base	Sizes 1, 2, 2H and 4	1MRK513003-BEN
RXY 4	Terminal base	Size 4U x 2C	NA
RXZ 1..	Panel base	DIN-rail mounting, 1, 2, 2H or 4 seat	1MRK513003-BEN
RXZ 21/41	Panel base	Surface mounting, 2 or 4 seat	1MRK513003-BEN
SLCE 12	Intermediate transformer	For RADSB, RADSC or RADSS	NA
SLCE 16	Intermediate transformer	For RADSS	NA
SLCE 8	Intermediate transformer	For RADHL	NA
SLMF	Intermediate transformer	For RADHL	NA
SLMF123	Intermediate transformer	Mainly used with RADSS. SLCE 16 is recommended as replacement	NA
SLXE 4	Intermediate transformer	For RADSS	NA
TM25	Intermediate transformer	For REB100	NA
TM50	Intermediate transformer	For REB100	NA

Protection Relays and Assemblies

Type	Designation of protection	Application/features	More techn. info. Buyer's Guide	User's Guide
RACIK	Time-overcurrent	Feeder	1MRK509032-BEN	1MRK509031-UEN
RADHA	High impedance differential	Short circuits on busbars etc	1MRK509015-BEN	UG 03-6011 E
RADHD	High impedance differential	Transformer restricted e-f	1MRK504005-BEN	1MDU04008-EN
RADHL	Pilot wire differential	Lines with 2 - 4 terminals	1MRK507004-BEN	1MRK507004-UEN
RADSB	Transformer differential	2 - 6 restraint inputs	1MRK504002-BEN	1MDU04007-EN
RADSC	Differential	Multi-purpose	1MRK509016-BEN	1MDU04023-EN
RAEDA	Time-voltage	Multi-purpose	1MRK509044-BEN	NA
RAEDK	Time-voltage	Multi-purpose	1MRK509004-BEN	1MRK509004-UEN
RAEG	Voltage	Multi-purpose	NA	NA
RAFK	Time-frequency	Multi-purpose, df and df/dt	1MRK509009-BEN	1MRK509009-UEN
RAGCX	Generator	Customized combination	1MRK502007-BEN	NA
RAGEK	Stator earth-fault	Rotating machines	1MRK502003-BEN	1MRK504006-UEN
RAGIK	Dead machine	Rotating machines	1MRK502003-BEN	NA
RAGPK	Loss-of-excitation	Rotating machines	1MRK502003-BEN	NA
RAHB	Breaker failure	Multi-function	1MRK509070-BEN	See remark
RAHL 401	Time-overcurrent and e-f	3 ph and e-f in solidly earthed systems	1MRK509062-BEN	See remark
RAHL 411	Multi-function	3 ph and e-f in solidly earthed systems	1MRK509049-BEN	See remark
RAHL 421	Multi-function	2 ph and dir. e-f in high impedance earthed systems	1MRK509053-BEN	See remark
RAHL 422	Multi-function	2 ph and dir. e-f in low impedance earthed systems	1MRK509057-BEN	See remark
RAICA	Breaker failure	HV-EHV breakers	1MRK505005-BEN	NA
RAIDG	Earth-fault	Extra sensitive	1MRK509002-BEN	1MRK509031-UEN
RAIDK	Time-overcurrent and e-f	Multi-purpose	1MRK509002-BEN	1MRK509031-UEN
RAIG	Current	Multi-purpose	1MRK509010-BEN	NA
RAIIK	Negative sequence overcurrent	Unbalanced loads in machines and on lines	1MRK509045-BEN	1MRK509045-UEN
RAISB	Harmonic restraint current	Transformer feeders	1MRK504003-BEN	NA?
RAISK	Voltage restraint time-	Multi-purpose	1MRK509033-BEN	1MRK509033-UEN
RALK	Time-overexcitation	Transformers and rot.	1MRK509008-BEN	1MRK509008-UEN
RANM	Various control devices	Units for tripping, reconnection…	1MRK509015-BEN	NA
RAPDK	Directional time-overcurrent	Multi-purpose	1MRK509007-BEN	1MRK509031-UEN
RAPPK	Reverse power	Rotating machines	1MRK509042-BEN	1MRK509042-UEN
RARIC	Shaft current	Rotating machines	1MRK502011-BEN	1MRK502001-UEN
RASC	Synchronism check relay	Breaker closing	1MRK510010-BEN	RK 862-302E
RAVK	Thermal overcurrent	Multi-purpose	1MRK509003-BEN	1MRK509003-UEN
RAZK	Under-impedance	Multi-purpose	1MRK509006-BEN	1MRK509006-UEN
REB 010	Breaker failure relay	For integration in REB101/103 & stand-alone	1MRK505004-BEN	NA
REB 101	Bus differential	Summation type	1MRK505006-BEN	1MRK505006-UEN
REB 103	Bus differential	Phase segregated type	1MRK505007-BEN	1MDU05006-EN
REXA	Auto-recloser	Over-head lines	1MRK510009-BEN	1MRK510013-UEN 1MRK510014-UEN

Chapter 2 The solution

THE COMBIFLEX® MOUNTING SYSTEM

About this chapter
COMBIFLEX® is a modular system for easy mounting and wiring of relay modules, components, accessories and terminal connections.

The COMBIFLEX® mounting system for relay equipment is based on decades of practical experience of assembly complete relay and control systems.

The system is based on the 19" rack standard, which permits simple combination of products using the same international standard. It offers various ways of building the relay and control panels. All the details of COMBIFLEX® contribute to well functioning panel designs.

The COMBIFLEX® mounting system has been designed to cover the common protection functions within respective areas of application.

Dimension definitions of the U and C modules in the COMBIFLEX system

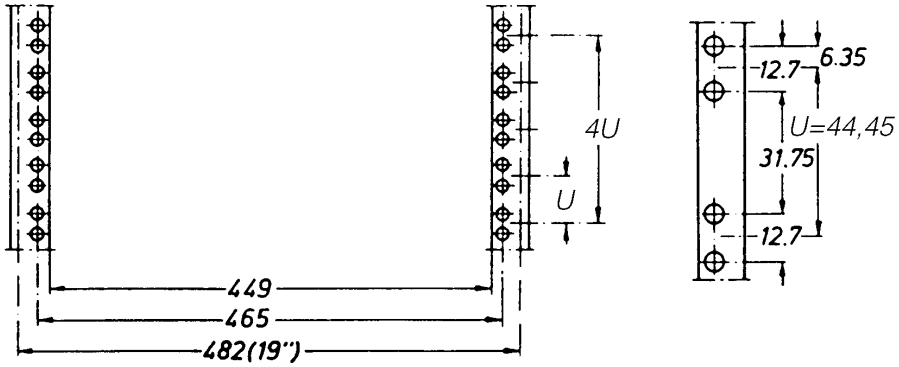
19" Rack dimensions

U

U is the height of the module and **C** the width in the ABB COMBIFLEX mounting system.

U= 44,45 mm (1,75")

U is derived from the international 19" rack mounting standard and is the vertical distance between the group of holes in the fixing bars of the cubicle (panel).

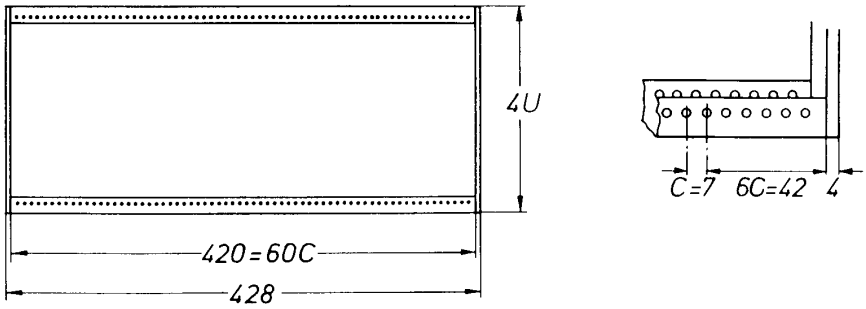


C

C= 7 mm (0,28")

C is the distance between fixing holes on the apparatus bars.

(A 19" apparatus frame is shown.)



Plug-in module (relay) sizes

There are four (4) sizes of plug-in modules, see figure 1.

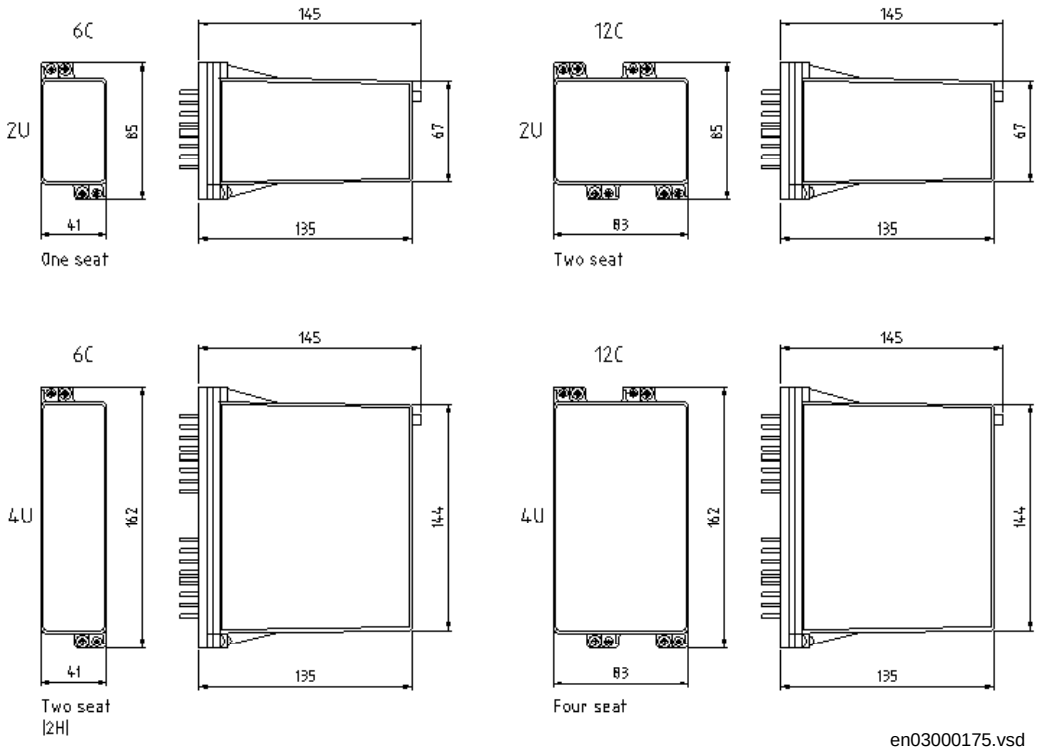


Fig.1

The terminal bases to these relay modules can be chosen according to the following pages. Note, that only terminal bases type RX2H and RX4 can be directly mounted to a 4U rack.

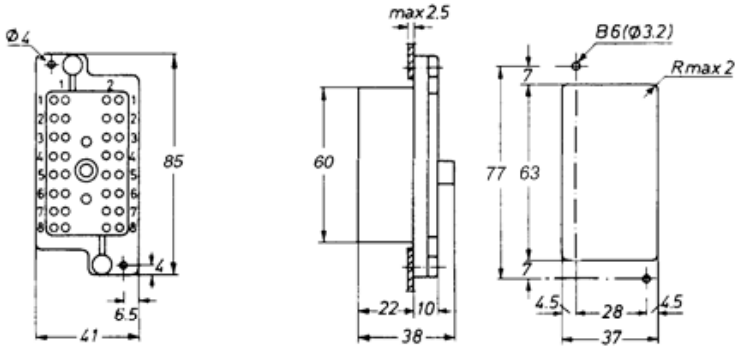
Terminal base alternatives

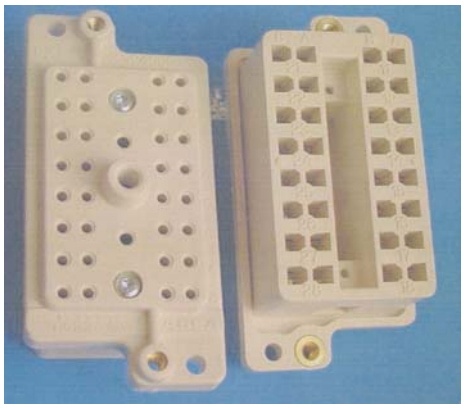
The terminal bases shown below match to these four relay module sizes, but there are several variants upon method of application.

Note: The screws (type ST 3,3 x 13) to fix the bases to the apparatus bars are not included in the delivery of the terminal bases. The screws to fix the plug-in module to the terminal base are attached to the module at delivery.

RX1 (2U 6C)

Panel cut-out



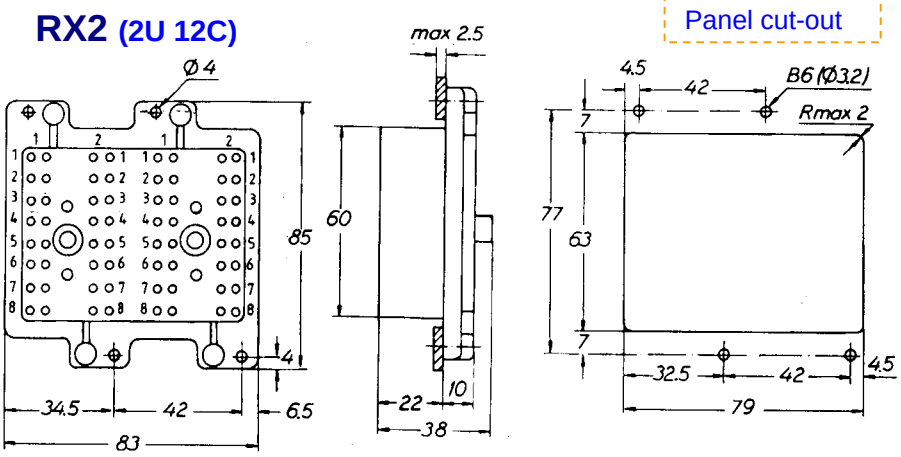


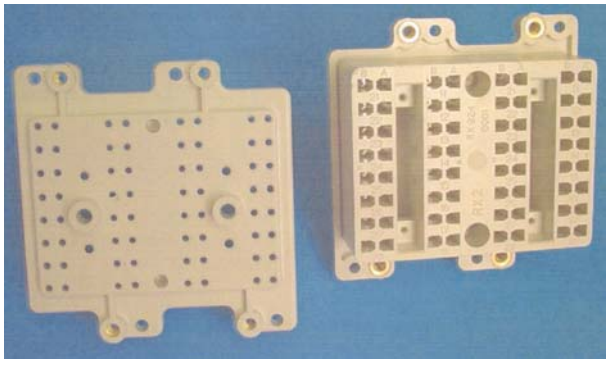
Ordering number 5619 622- A

On Terminal base type RX1 one 1-seat plug-in module can be mounted.

RX2 (2U 12C)

Panel cut-out



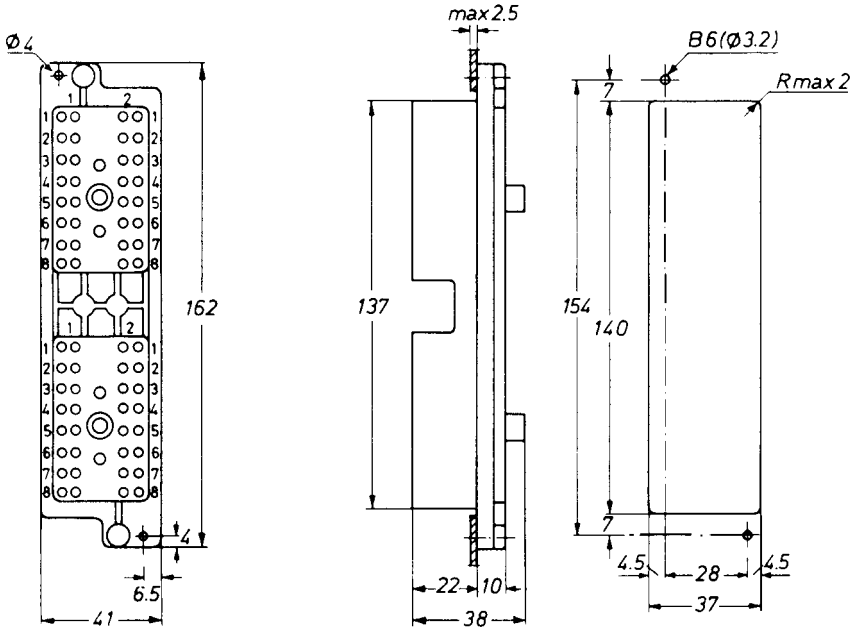


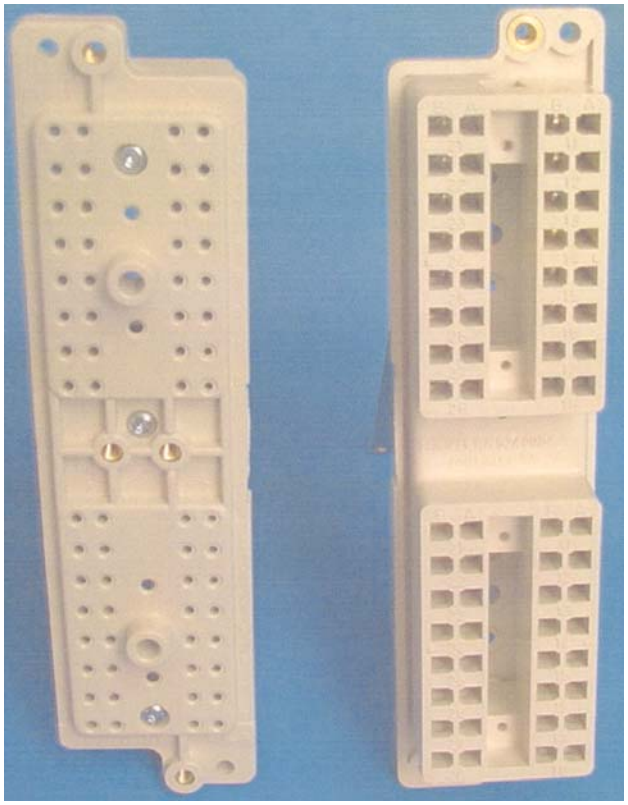
Ordering number 5619 483- A

On Terminal base type RX2 one 2-seat plug-in modules or two 1-seat modules can be mounted.

RX2H (4U 6C)

Panel cut-out

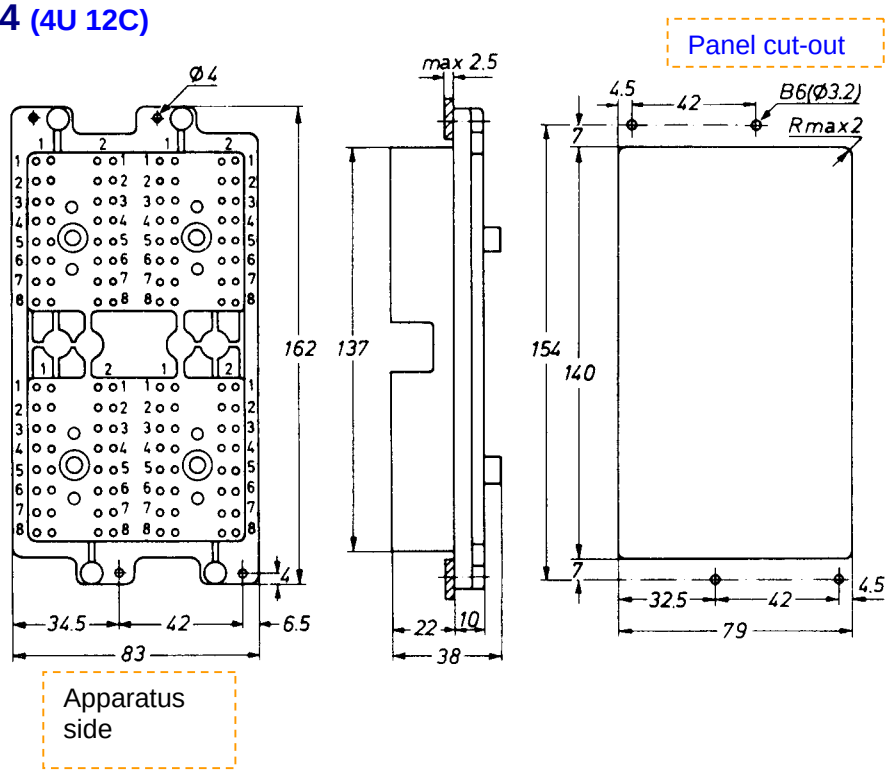


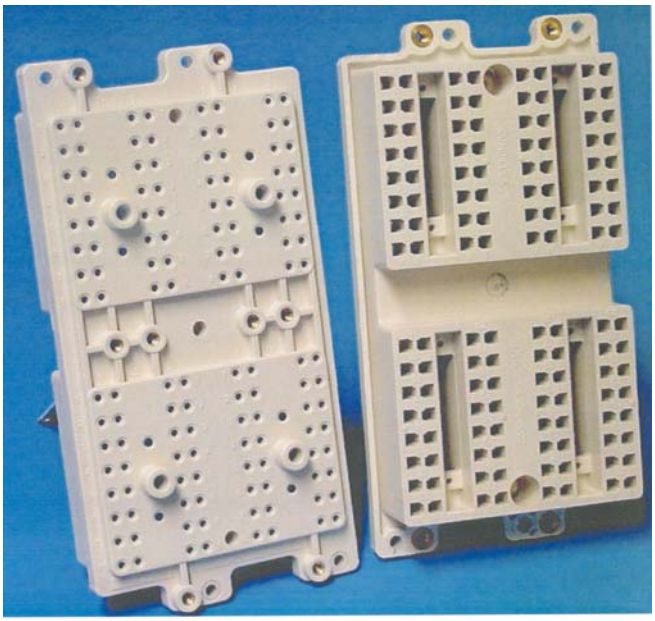


Ordering number 5619 625-A

On Terminal base type RX2H two 1-seat plug-in modules or one 2H-seat module can be mounted.

RX4 (4U 12C)



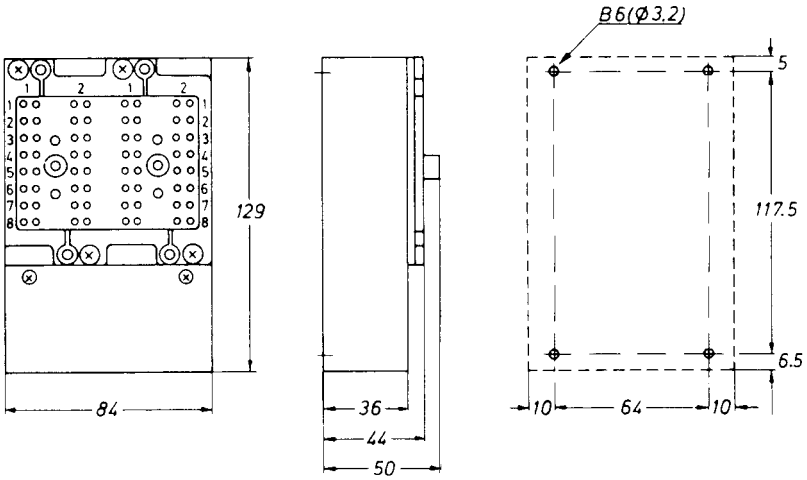


Ordering number: 5619 499-A

On Terminal base type RX4 four 1-seat or two 2-seat or two 2H-seat or four 1-seat plug-in modules can be mounted.

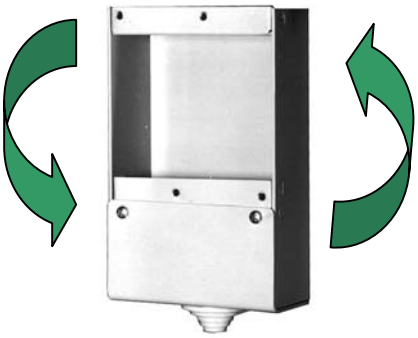
Panel bases

RXZ 21

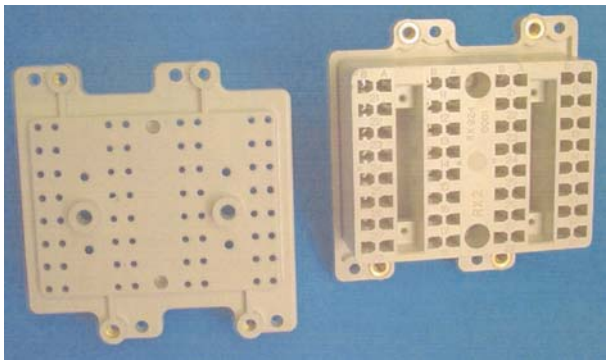


Complete with support case and terminal base.

Ordering number: RK 928 008-AB



Consisting of:



Support case

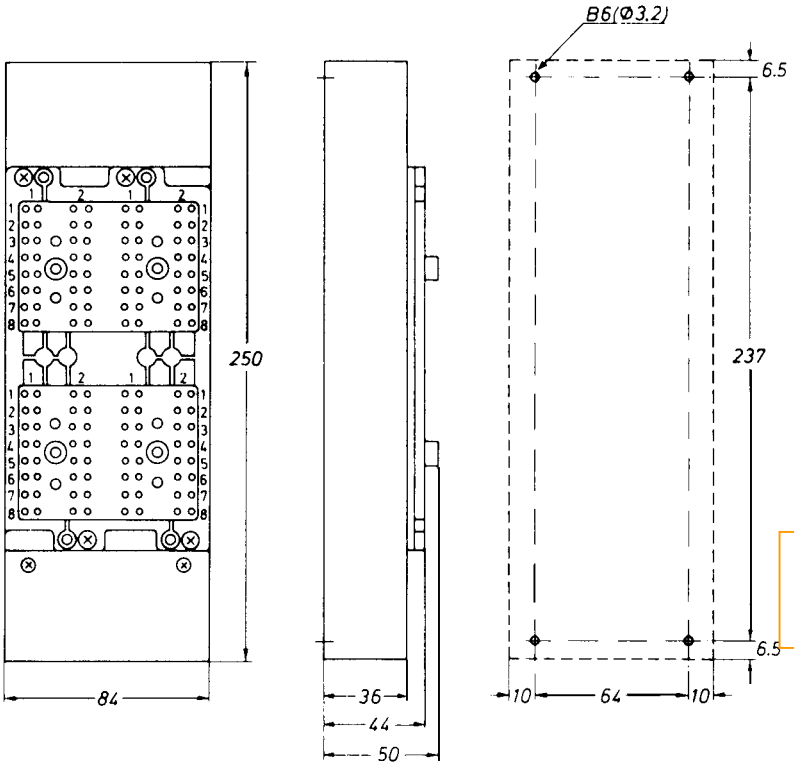
Ordering number: RK 928 008-AA

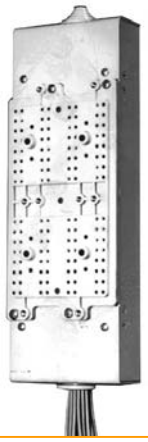
+

RX2 Terminal base
4 screws ST 3,5x13 are required for fixing to case.

Ordering number: 5619 483-A

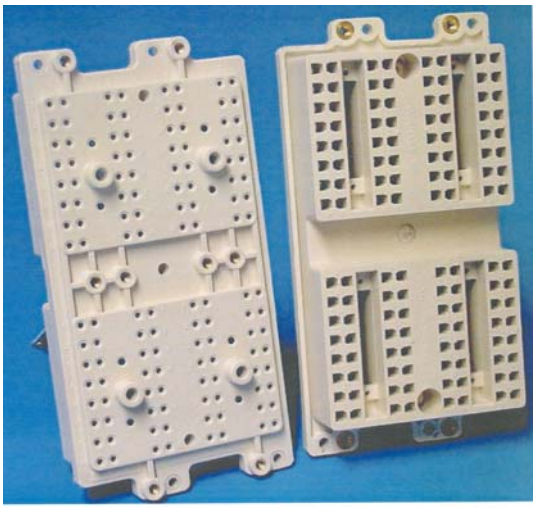
RXZ 41





Complete with support case and terminal base.
Ordering number: RK 928 009-AB

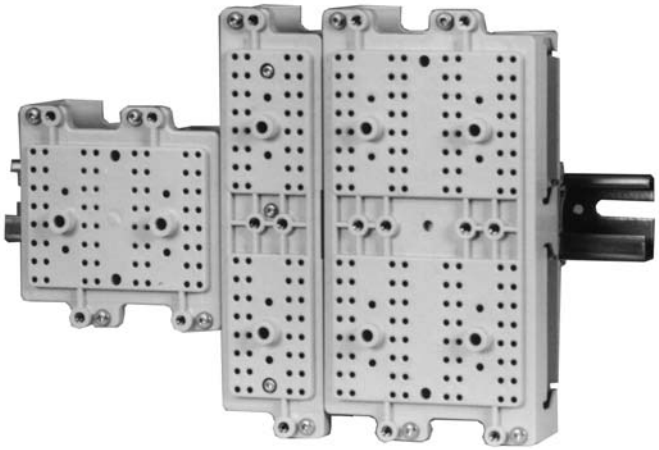
Consisting of:



Support case
Ordering number RK 928 009-AA

RX4 Terminal base
Ordering number 5619 499-A
4 screws ST 3,5x13 are required for fixing to case.

Rail mounting



Terminal bases, height 2U and 4U
(RX2, RX2H and RX4)

Relays, height 2U and 4U with terminal bases RX2H and RX4 mounted on the DIN-rail.

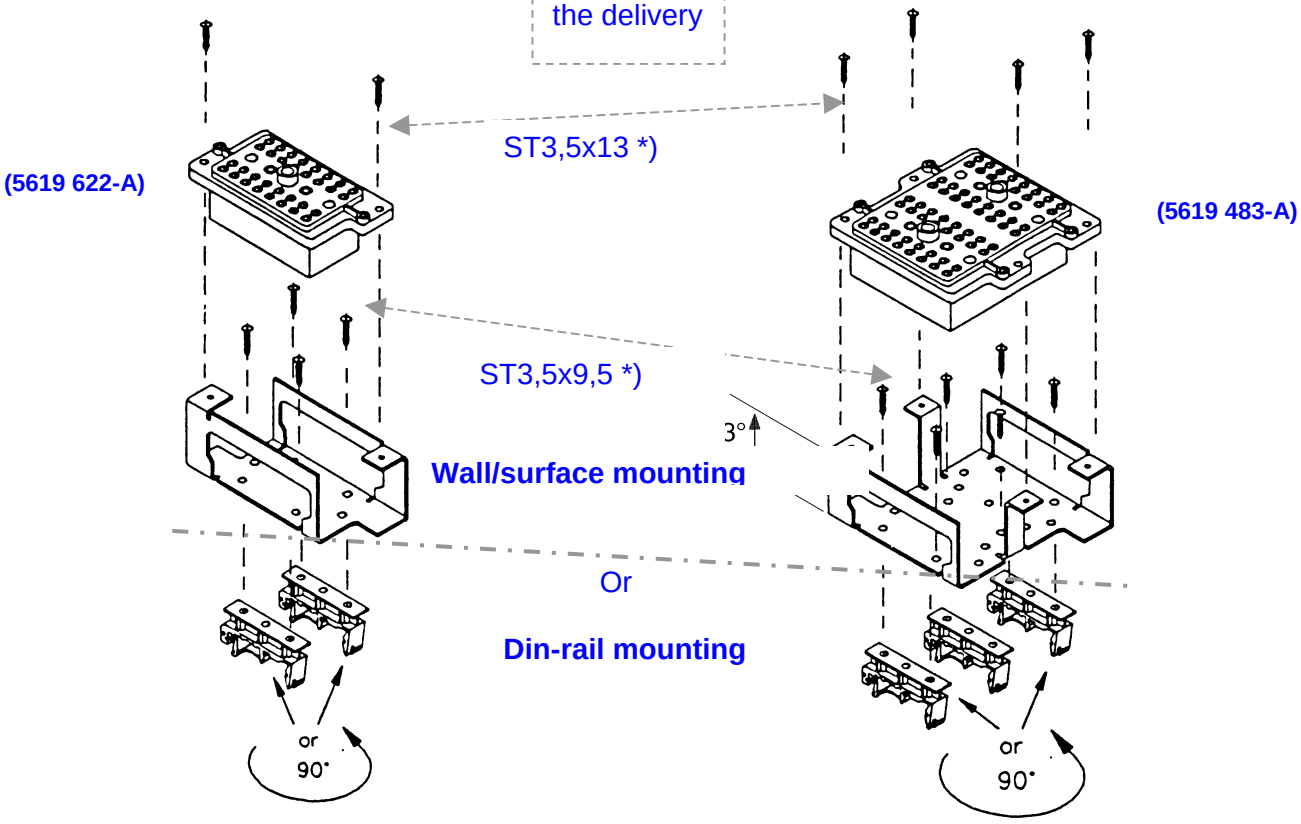
Relays height 2U with Terminal base RX1 and/or RX2 Terminal bases mounted on the DIN-rail.

The mounting instructions are shown on the next page.

RXZ 1, (2U6C)
Ordering No. 1MRK 000 893-A

Screws are enclosed in the delivery

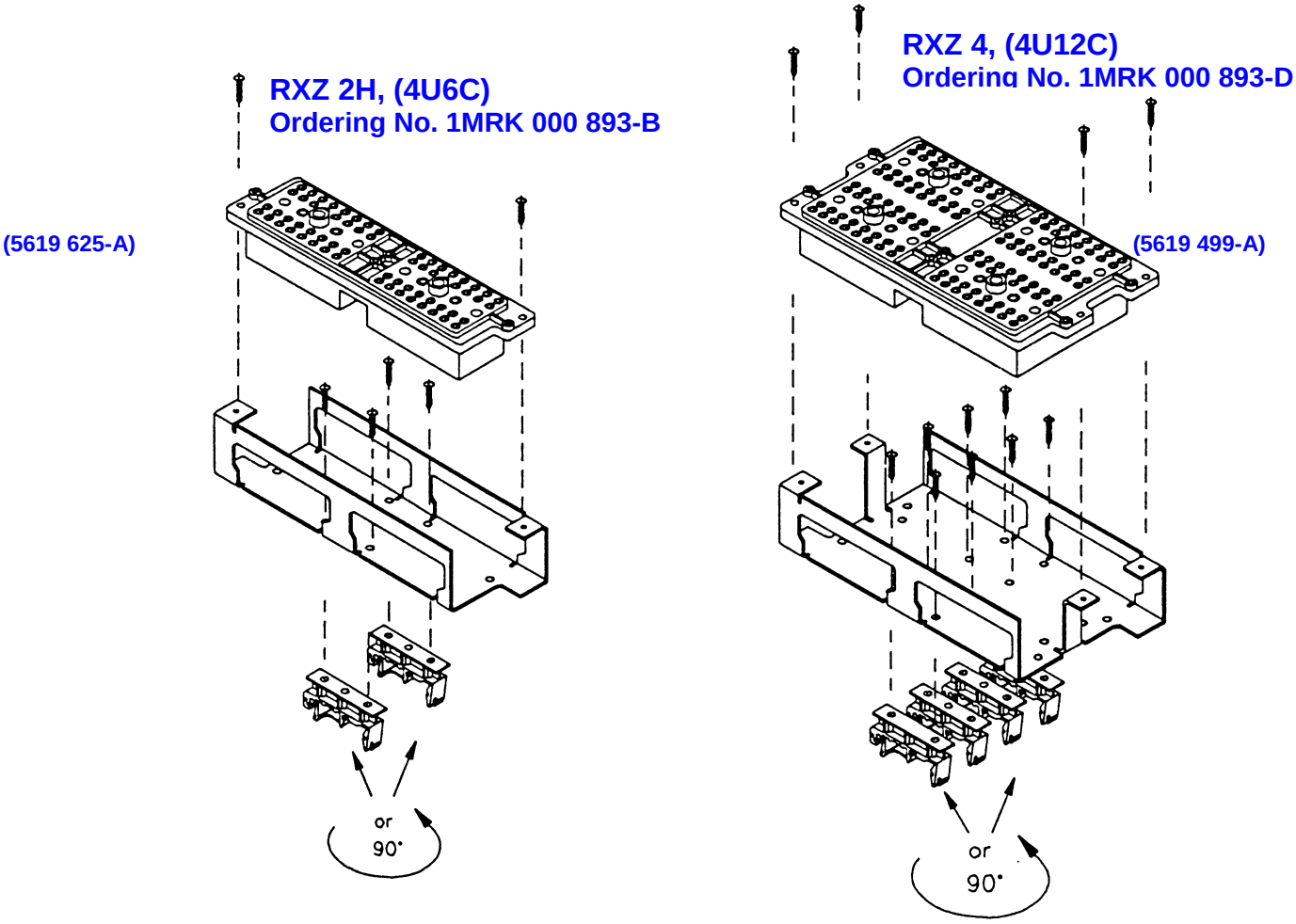
RXZ 2, (2U12C)
Ordering No. 1MRK 000 893-C



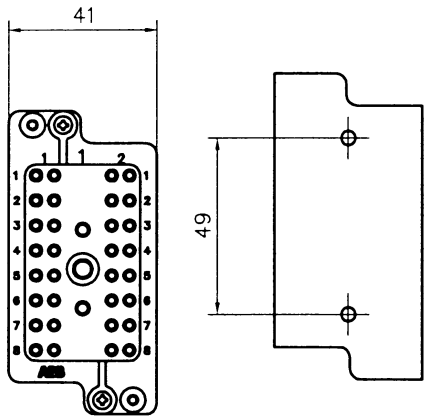
*) Screws are included in delivery and are of Torx type and screw driver Tx10 is needed: (

RXZ 2H, (4U6C)
Ordering No. 1MRK 000 893-B

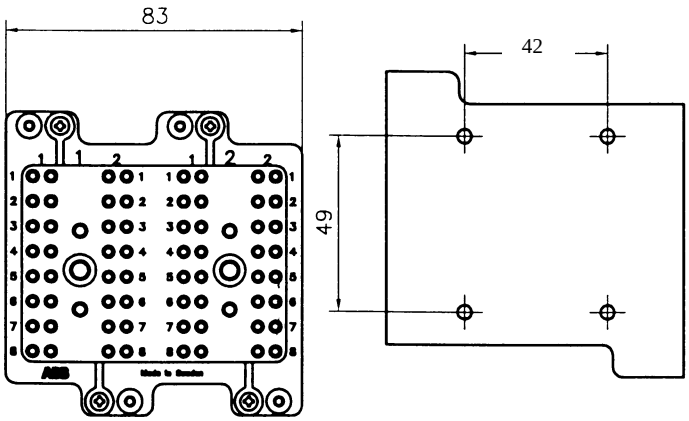
RXZ 4, (4U12C)
Ordering No. 1MRK 000 893-D



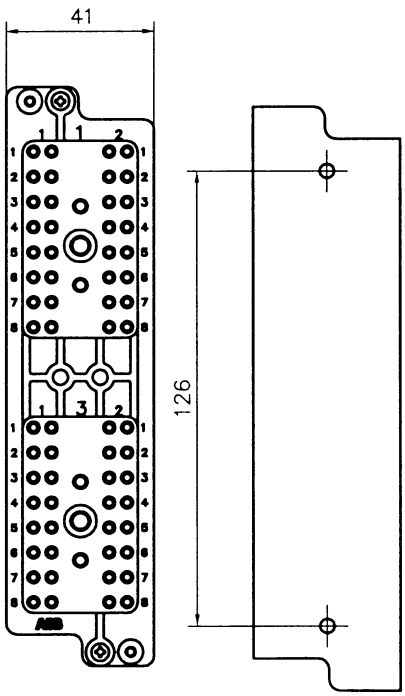
Dimensions and drilling plans for wall/surface mounting of RXZ terminal bases i.e. mounting on the panel or wall without rail mounting details.



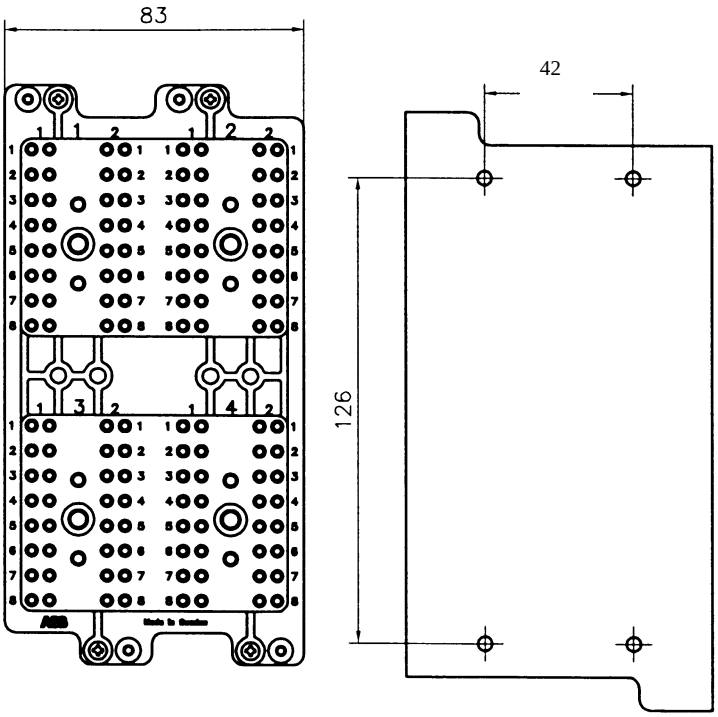
RXZ 1



RXZ 2

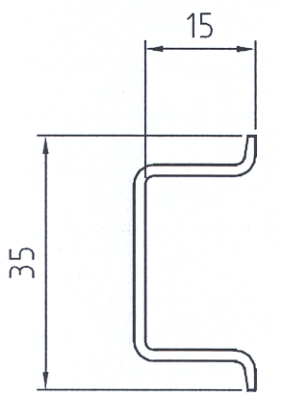


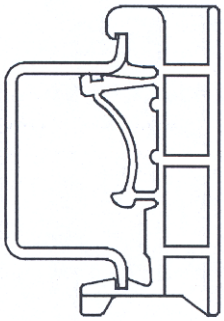
RXZ 2H

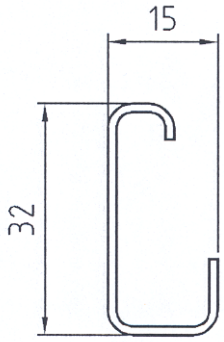


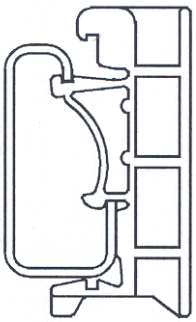
RXZ 4

Dimensions

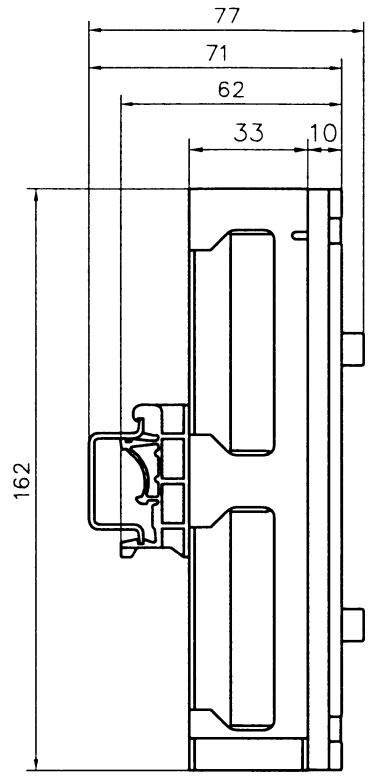




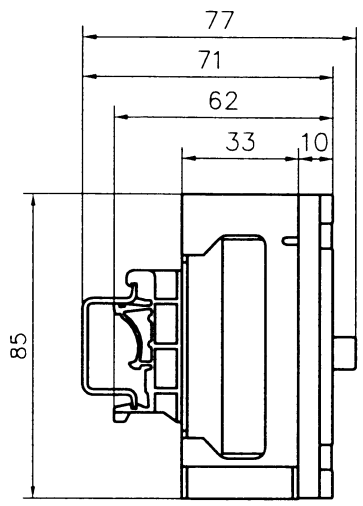




RXZ 2H and RXZ 4



RXZ 1 and RXZ 2

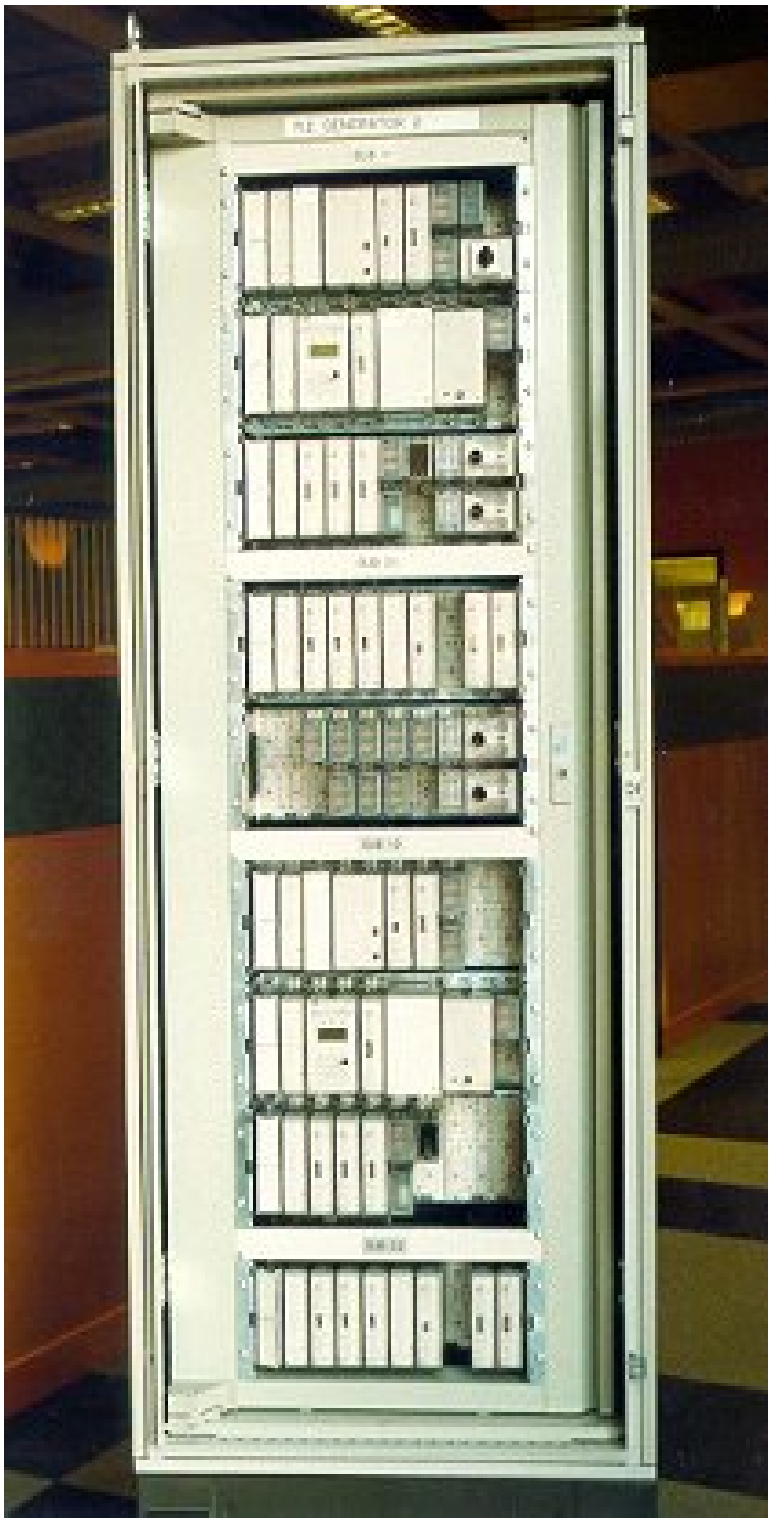


Chapter 3 Conventional rack mounting

About this chapter

This chapter describes different methods to build your panels by using the COMBIFLEX system.

Different ways to build panels by using the COMBIFLEX mounting system



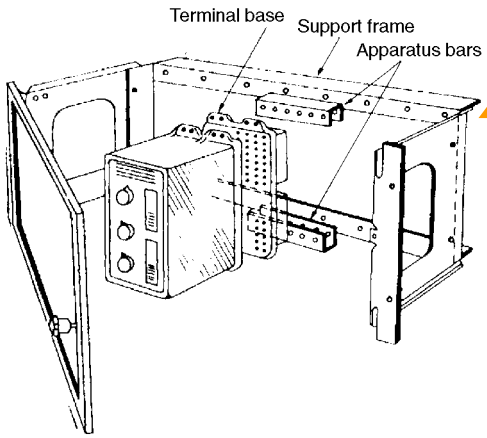
An example of a swing-rack cabinet containing a generator protection system.

Conventional 19" rack mounting

1. 4U 19" Equipment frame with support frame with or without door with window.

For mounting of relay assemblies (apparatus groups) on the apparatus bars.

1Fig.

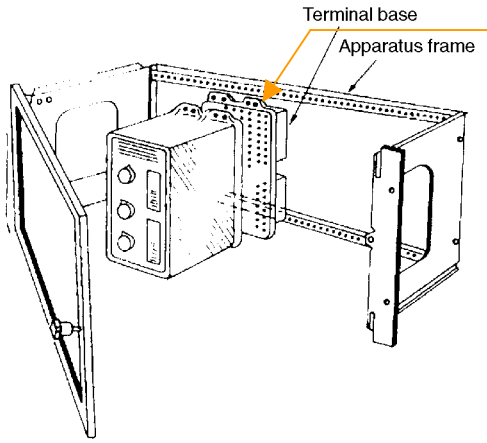


The apparatus bars or apparatus groups shall be fixed to support frame with ST3,5x13 mm tapping screws from the rear side.

A typical Apparatus group

2. 4U 19" Equipment frame with apparatus frame with or without door with window.

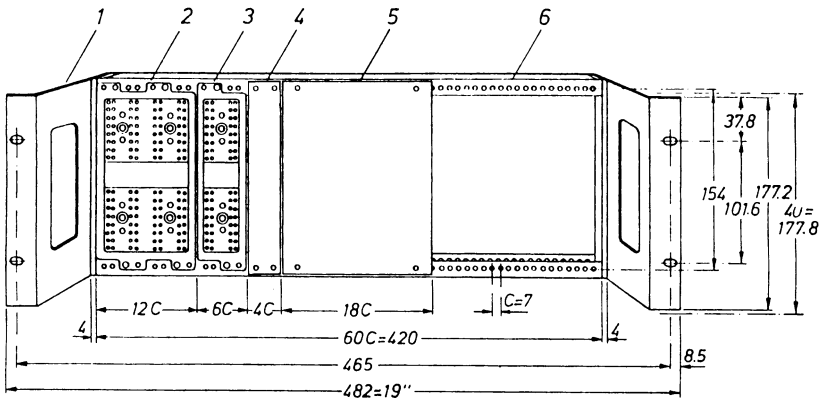
2 Fig.



To be fixed to apparatus frame with ST 3,5 x 13 mm tapping screws.

For mounting of;
Terminal bases RX4 acc. to 3:2 below
and/or RX2H acc. to 3:3 below
4Ux4C Apparatus plate acc. to 3:4 below
4Ux18C Apparatus plate acc. to 3:5 below
4Ux60C Apparatus plate, not shown on the picture

3. Dimensions



3:1) End plate (x2)
3:2) RX 4 Terminal base
3:3) RX2H Terminal base
3:4) 4C4U Apparatus plate
3:5) Apparatus plate
3:6) Apparatus frame

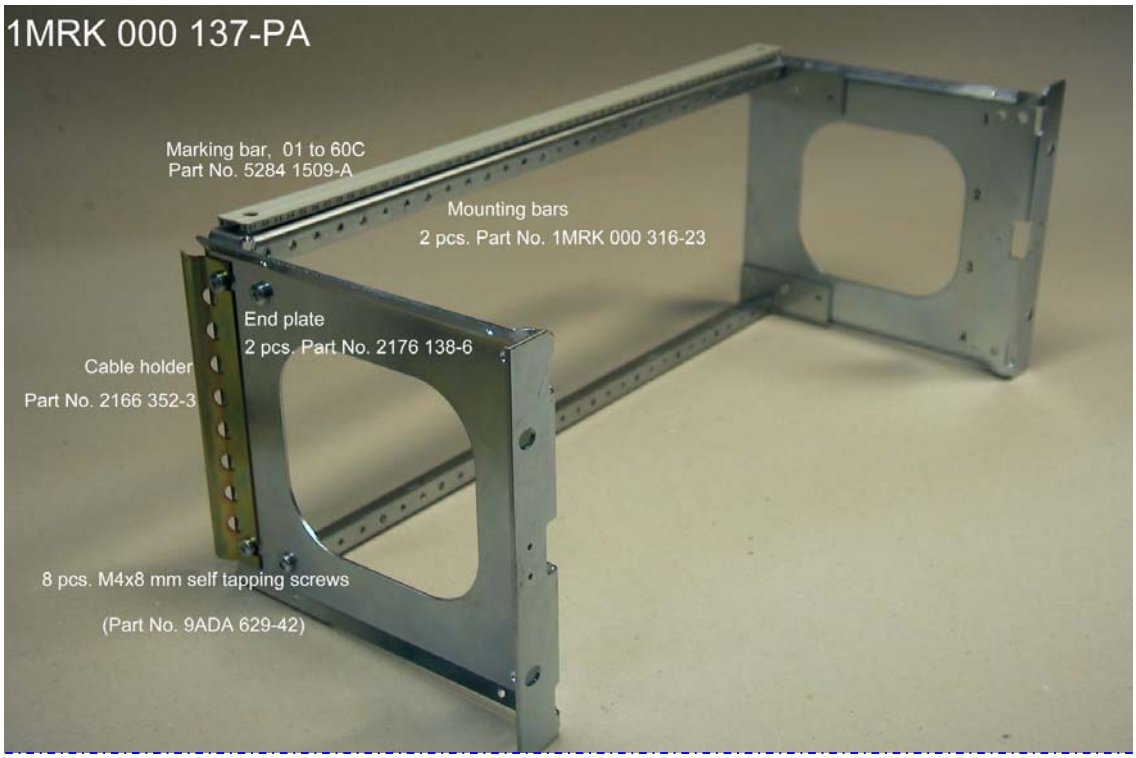
Equipment frame RHGT 20, 4U 60C, a combined apparatus / support frame

RHGT 20, a convenient rack for 19" cubicle mounting is composed of 2 mounting bars mounted together with 2 end panels 4 U (7") high. The bars combine the features of support frame and apparatus frame.
The bars enable mounting of relays at 2 different positions in depth within the equipment frame. This permits a good alignment with surfaces of other equipment in the equipment frame/panel.
The hole punching has been fitted for fixing of already mounted apparatus groups by 4,2 mm run-through hole on the bar which make possible fasten the apparatus group by screw ST3, 5x13 inserted from rear side of the frame.
The smaller holes of 3.2 mm are adapted to fasten the 4U high Terminal bases with the ST 3,5x13 screws

The marking bar, 01 to 60 C can be fasten on the frame as in the earlier versions of the racks with support or apparatus frames.

The bar provides holes for fastening of cable channel at the bottom of the rack.

Basic, unassembled rack kit, without window door, Part No. 1MRK 000 137-PA



The rack kit consist of 6 parts:

1 pc. Marking bar (01 to 60C)
2 pcs. Mounting bars,
2 pcs. End plates
1 pc. Cable holder

to be assembled together with

8 pcs self tapping screws, M4 x 8 mm.*) Torx type

***)A screw driver of pneumatic or electrical type is recommended**

Delivered in a package, all material included

Available also with a transparent window door

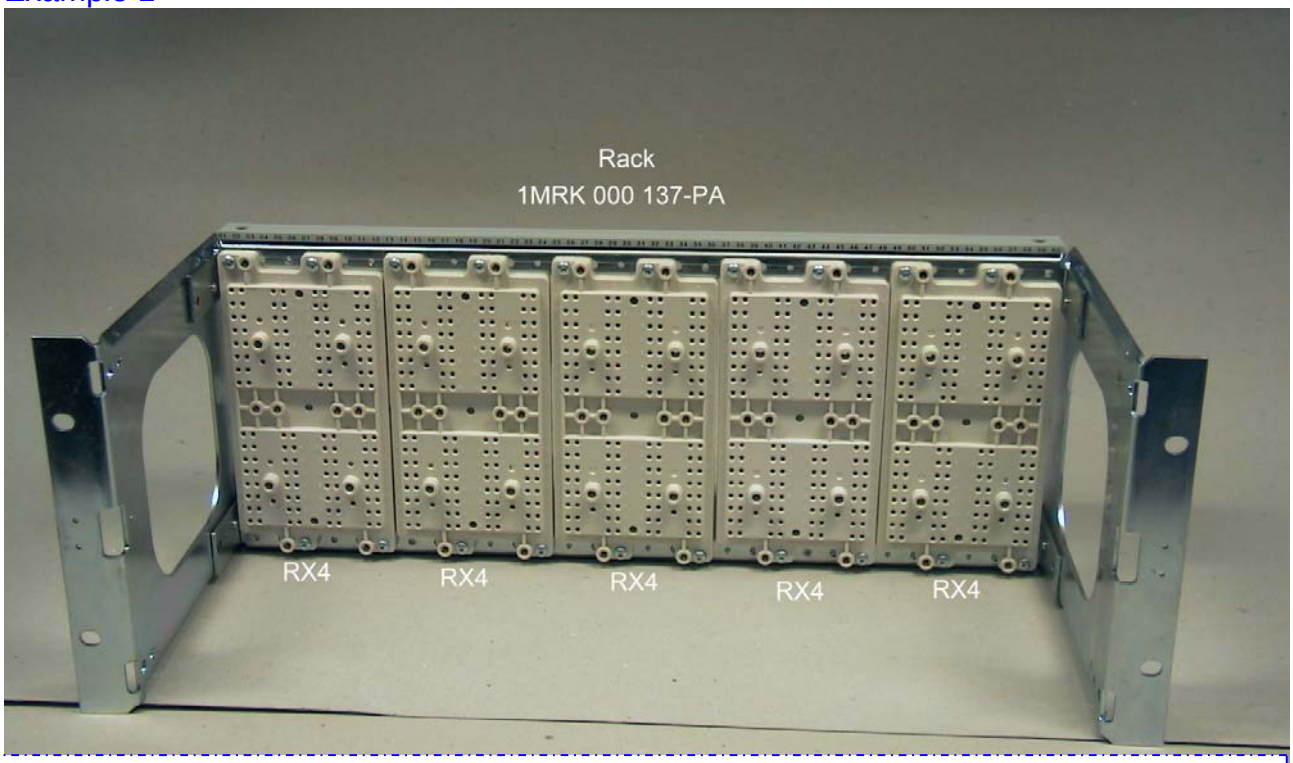
Colour of the window frame: ABB light beige

In addition to material in kit 1MRK 000 137-PA, the kit **Part No. 1MRK 000 137-RA** include also a window door consisting of following parts:

Qty	Name	Part number
1	Door 4U	5284 1342-Y
2	Hinge half	2184 0512-1
1	Lock stop	2167 247-3

The rack is with advantage applicable for example:

Example 1



A rack for mounting of:

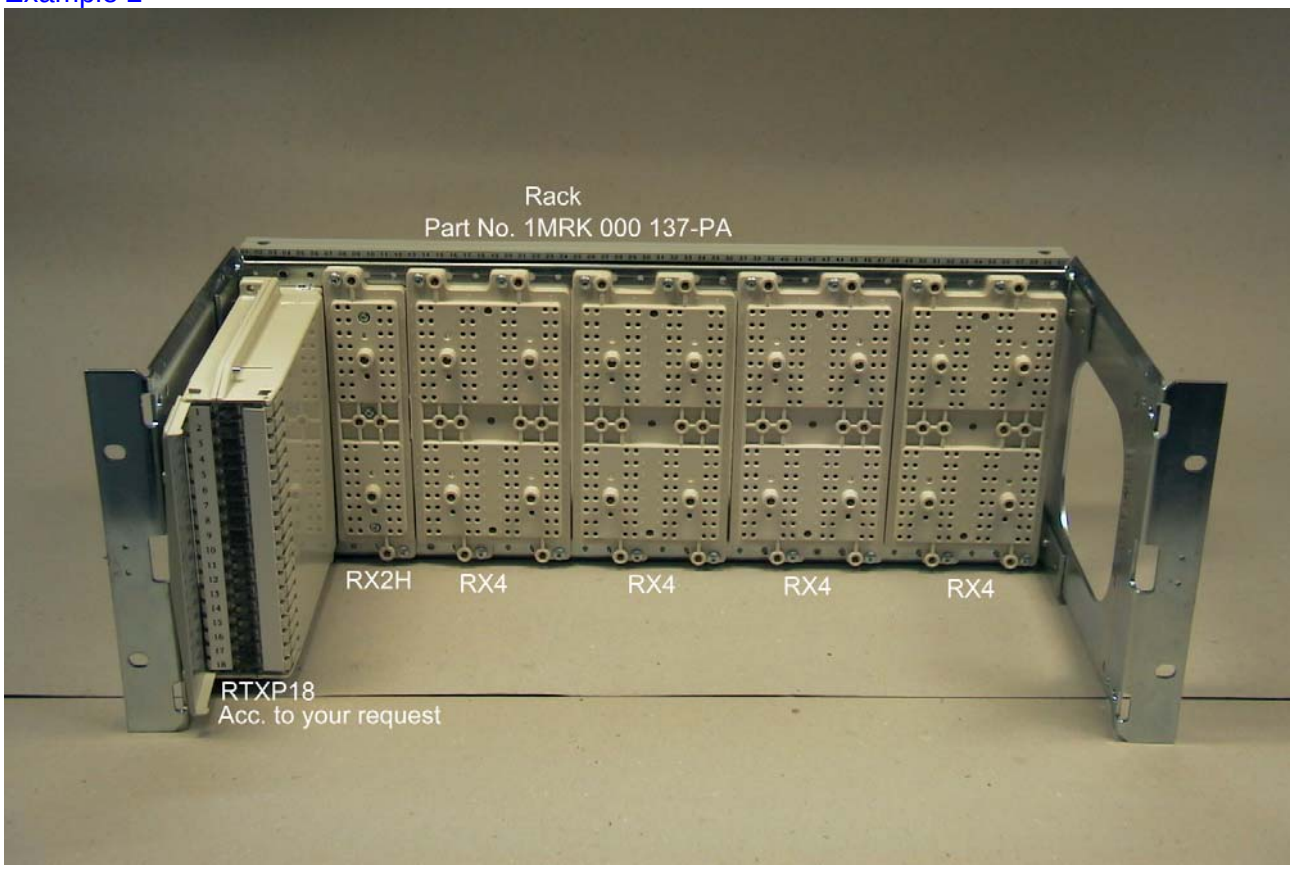
20 Relays of one seat size or
10 Relays of 2H seat size or
5 Relays of four seat size, or a mix

Consisting of: Rack kit, Part No. 1MRK 000 137-PA

Optional material to be ordered:

5 pcs. of Terminal base, Part No. 5619 499-A

Example 2



A rack mounting of:

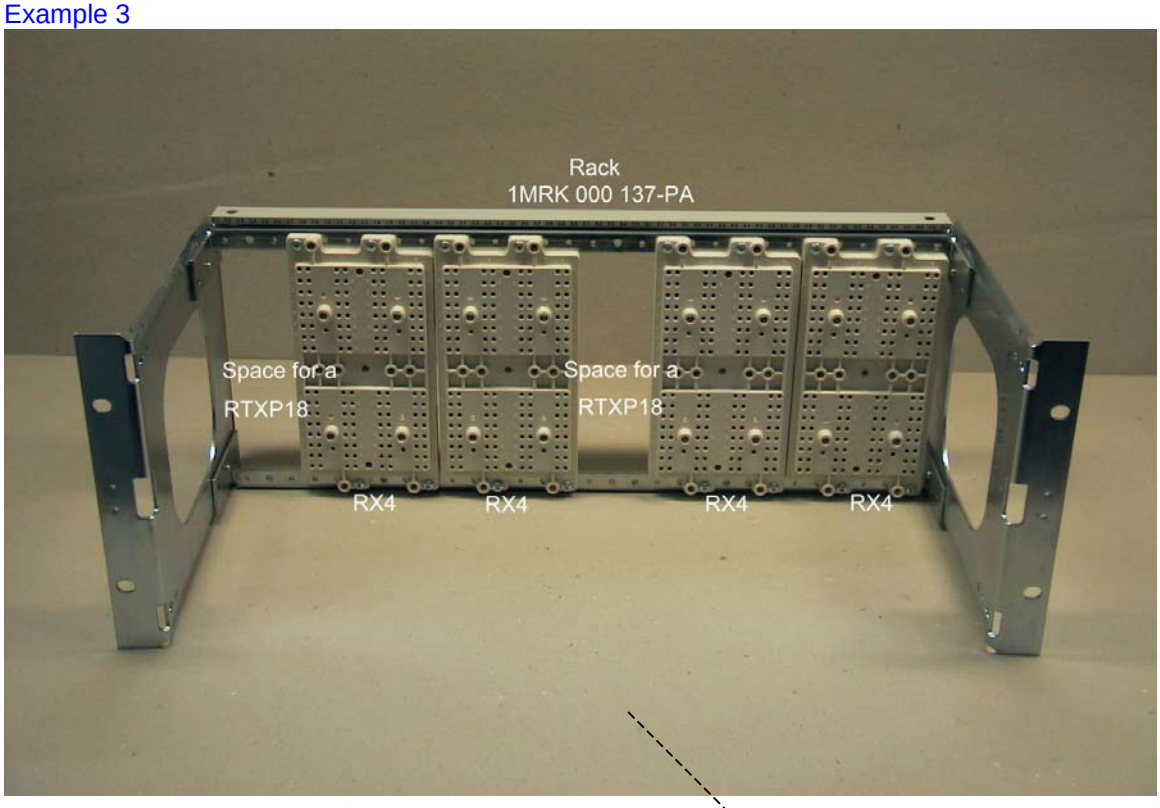
1 pc. Test switch type RTXP18
18 pcs. One seat relays or
9 pcs. 2H two seats relays or
1 pc. 2H two seats relay and 4 pcs. of four seats relays

Consisting of: Rack kit, Part No. 1MRK 000 137-PA

Optional material to be ordered:

1 pc. Test switch RTXP18,	Part No. RK 926 115-xx
1 pc. Terminal base RX2H,	Part No. 5619 625-A
4 pcs. Terminal base RX4,	Part No. 5619 499-A

Example 3



A rack for mounting of 2 Apparatus groups (Protective relays) and Test switch RTXP18 for each one:

Consisting of: Rack kit, Part No. 1MRK 000 137-PA

Optional material to be ordered:

2 pcs. Test switch RTXP18,	Part No. RK 926 115-xx
4 pcs. Terminal base RX4,	Part No. 5619 499-A

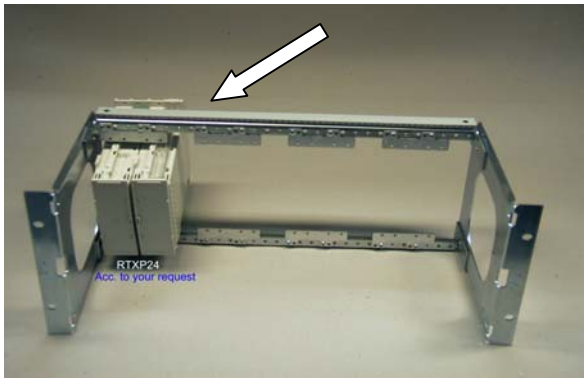
Example 4

A distance of min. 1C (7 mm) is request between each Test switch for the opening of the cover locks. Max. 4 pcs of RTXP24 can be mounted to a rack of 19".

A rack for mounting of max. 4 Test switches type RTXP24:
(suitable for mounting of Test switches in cubicle for RED&RET521 with more than one AIM module)

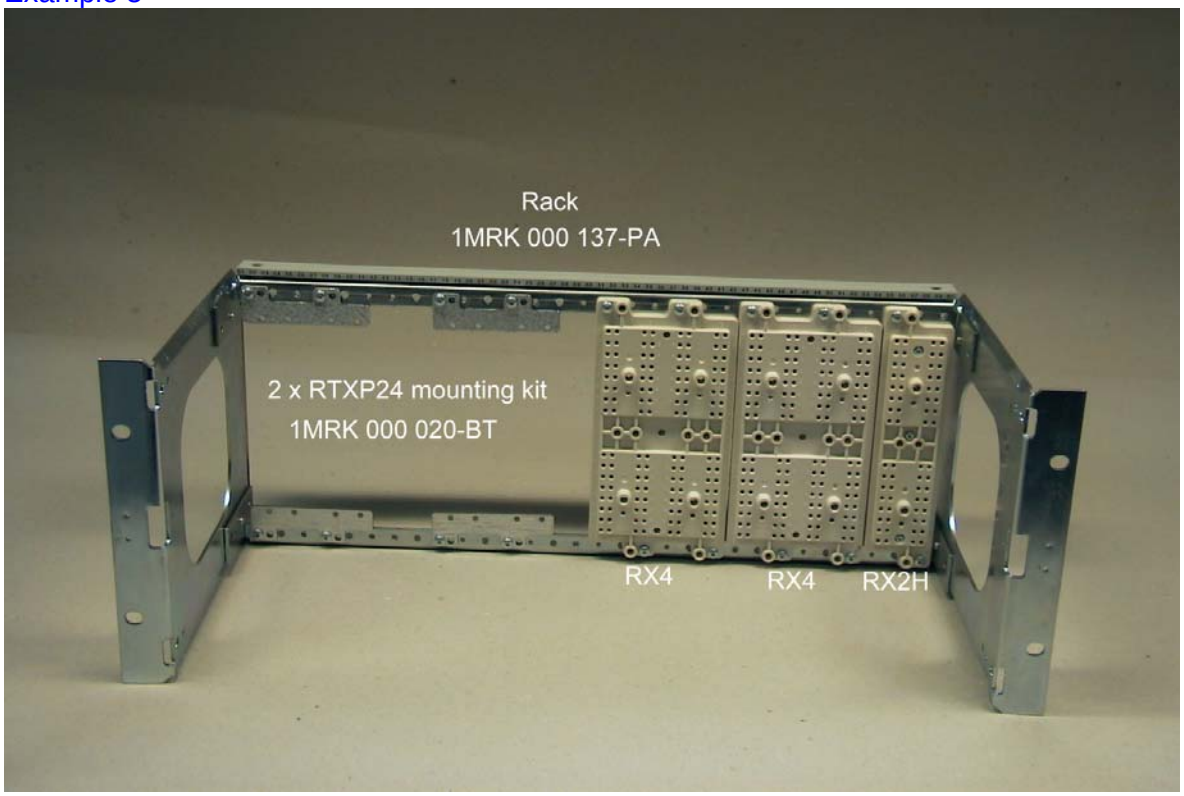
Consisting of: Rack kit, Part No. 1MRK 000 137-PA

Optional material to be ordered:
4 pcs. Test switch RTXP24, Part No. RK 926 315-xx
4 pcs. Mounting kit for RTXP24, Part No. 1MRK 000 020-BT



Please note that the Test switches are to be inserted and fixed from rear side of the rack.

Example 5



A rack for mounting of 2 pcs. Test switches type RTXP24 and space for 10 tripping relays (suitable e.g. for mounting of Test switches in cubicle for RED 521 with two AIM modules)

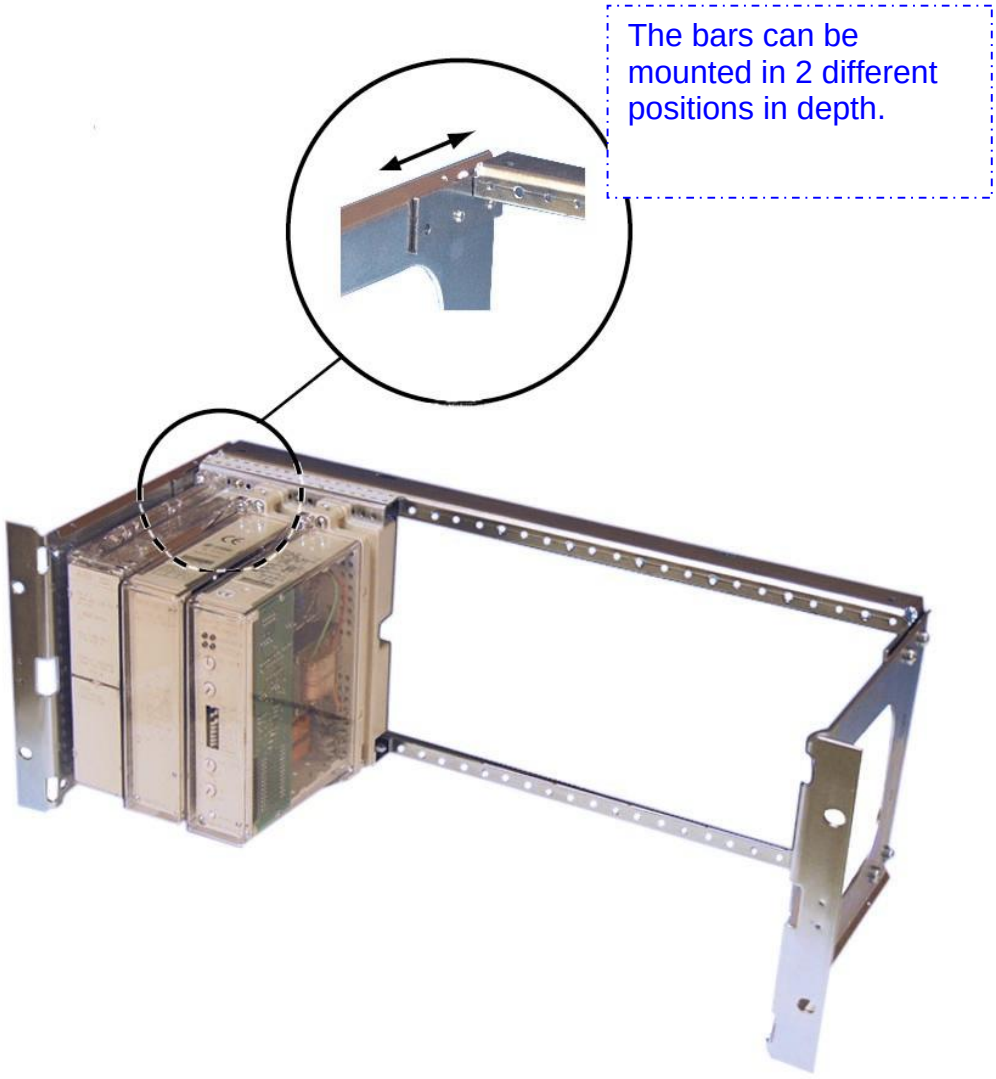
Consisting of: Rack kit, Part No. 1MRK 000 137-PA

Optional material to be ordered:

2 pcs. Test switch RTXP24,	Part No. RK 926 315-xx
2 pcs. Mounting kit for RTXP24,	Part No. 1MRK 000 020-BT
2 pcs. Terminal base RX4,	Part No. 5619 499-A
1 pc. Terminal base RX2H	Part No. 5619 625-A

Example 6

As the bars are a combination of support and apparatus frame, it fits also for mounting of ready made Apparatus groups on the apparatus bars (Protection relays) and loose Terminal bases on the same bar.
Apparatus groups are fixed through the 4.2 mm holes from the rear side of the rack.



Equipment frame 4U 60C with apparatus frame

Please note: This rack can be used for same applications as the previous, (1MRK 000 137-PA or-RA), except for ready made Apparatus groups (Relay assemblies on the apparatus bars).

For mounting of terminal bases, apparatus plates and COMBITEST test switches.

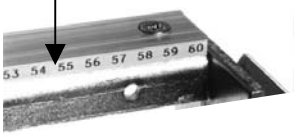
Assembled	**Ordering number**
without door	**1MRK 000 137-AA**
with transparent window door	**1MRK 000 137-DA**

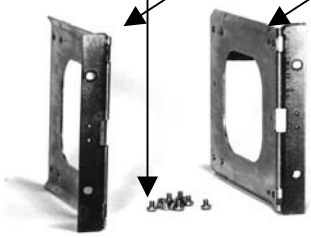
Note:
The position of the relay front can be varied by means of the two holes in the different position on the end panels. The same is valid for apparatus- as well for support frames.

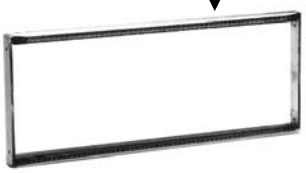
Unassembled	**Ordering number**
Without door	**5284 1935-A**

Consisting of following material:

Qty	Name	Article number
1	Apparatus frame	5284 1340-A
2	End panels	2176 138-6
1	Marking bar	5284 1509-A
1	Set of screws	5284 1935-N *) Note!)







***)**

Qty	Data	Type	Screw driver
4	M6x10	Torx thread forming screw	Tx 30
6	M5x6	Torx	Tx 20
2	2,5x5	Cross recalsintrant tapping rivet	Hammer
1	3,5x6,5	Torx pan head tapping screw	TX 10 (15)
4	M4x8	Torx pan head tapping screw	Tx 20

Torx

Note:
For assembly of frames with the enclosed set of screws, screw drivers type Torx is a necessity.

Unassembled	**Ordering number**
With transparent window door	**5284 1935-D*)**

*) In addition to material in 5284 1935-A as above the material set 5284 1935-D include also

Qty	Name	Article number
1	Door 4U	5284 1342-Y
2	Hinge half	2184 0512-1
1	Lock stop	2167 247-3

Equipment frame 4U 60C with support frame

For mounting of
Relay assemblies with apparatus bars.

Assembled

	Ordering number
Without door	1MRK 000 137-GA
With transparent window door	1MRK 000 137-KA

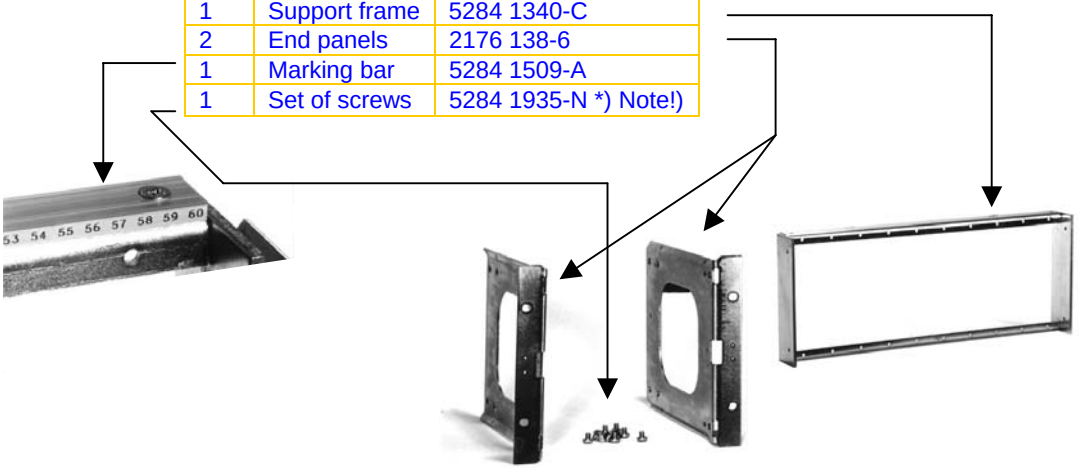
Note: For assembly of additionally terminal bases for loose relays or mounting of apparatus plates the apparatus bars is prior to be mounted to the support frame.

Unassembled

	Ordering number
Without door	5284 1935-G

Consisting of following material:

Qty	Name	Article number
1	Support frame	5284 1340-C
2	End panels	2176 138-6
1	Marking bar	5284 1509-A
1	Set of screws	5284 1935-N *) Note!)



*)

Qty	Data	Type	Screw driver
4	M6x10	Torx thread forming screw	Tx 30 (1MRK 000 436-6)
6	M5x6	Torx	Tx 20 (1MRK 000 436-4)
2	2,5x5	Cross rec. tapping rivet	Hammer
1	ST3,5x6,5	Torx pan head tapping screw	TX 10 (1MRK 000 436-3)
4	M4x8	Torx pan head tapping screw	Tx 20 (1MRK 000 436-4)

Torx

Note!)
For assembly of frames with the enclosed set of screws, screw drivers type Torx is a necessity.

Unassembled

	Ordering number
With transparent window door	5284 1935-K *)

*) In addition to material in 5284 1935-G as above the material set 5284 1935-K include also:

Qty	Name	Article number
1	Door 4U	5284 1342-Y
2	Hinge half	2184 0512-1
1	Lock stop	2167 247-3

Equipment frame 8U 60C with apparatus frame

For mounting of terminal bases and apparatus plates.

Available as unassembled, only

Unassembled **Ordering number**

Without door 5284 1935-B

A set of following material:

Qty	Name	Article number
2	Apparatus frame	5284 1340-A
2	End panels	2176 138-7
2	Marking bar	5284 1509-A
2	Set of screws	5284 1935-N *) Note!)

***)** see earlier page

Qty	Data	Type	Screw driver
4	M6x10	Torx thread forming screw	Tx 30 (1MRK 000 436-6)
6	M5x6	Torx	Tx 20 (1MRK 000 436-3)
2	2,5x5	Cross rec. tapping rivet	Hammer
1	3,5x6,5	Torx pan head tapping screw	TX 10 (1MRK 000 436-3)
4	M4x8	Torx pan head tapping screw	Tx 20

Torx

Note)
For assembly of frames with the enclosed set of screws, screw drivers type Torx is a necessity.

Unassembled **Ordering number**

With transparent window door 5284 1935-E *)

*) In addition to the material in 5284 1935-B the material set 5284 1935-E include also:

Qty	Name	Ordering number
2	Door 4U	5284 1342-Y
4	Hinge half	2184 0512-1
2	Lock stop	2167 247-3

Equipment frame 8U 60C with support frame

With support frame for mounting of Relay assemblies with apparatus bars

Available as unassembled, only

Note: For assembly of additional terminal bases
Or mounting of apparatus plates, the apparatus bars is to be mounted

Unassembled	Ordering number
Without door	**5284 1935-H**

Consisting of following material:

Qty	Name	Article number
2	Support frame	5284 1340-C
2	End panels	2176 138-7
2	Marking strip	5284 1509-A
2	Set of screws	5284 1935-N *) Note!)

*) see earlier page

Qty	Data	Type	Screw driver/tools
4	M6x10	Torx thread forming screw	Tx 30 (1MRK 000 436-6)
6	M5x6	Torx	Tx 20 (1MRK 000 436-3)
2	2,5x5	Cross rec. tapping screw	Hammer
1	ST3,5x6,5	Torx pan head tapping screw	TX 10 (1MRK 000 436-3)
4	M4x8	Torx pan head tapping screw	Tx 20

Note!)

For assembly of frames, screw drivers type Torx, T10, T20, T25 and T30 is a necessity.


Torx

Unassembled	Ordering number
With transparent window door	5284 1935-L *)

*) In addition to the material in 5284 1935-H the material set 5284 1935-L include also:

Qty	Name	Ordering number
2	Door 4U	5284 1342-Y
4	Hinge half	2184 0512-1
2	Lock stop	2167 247-3

Equipment frame 12U 60C with apparatus frame

Available as unassembled, only

Unassembled — Ordering number

Without door — **5284 1935-C**

Consisting of following material:

Qty	Name	Ordering number
3	Apparatus frame	5284 1340-A
2	End panels	2167 138-8
3	Marking strip	5284 1509-A
3	Set of screws	5284 1935-N *) Note!)

*) see earlier page

Qty	Data	Type
4	M6x10	Torx thread forming screw
6	M5x6	Torx
2	2,5x5	Cross rec. tapping rivet
1	3,5x6,5	Torx pan head tapping screw
4	M4x8	Torx pan head tapping screw

Note!)

For assembly of frames, screw drivers type Torx, T10, T20, T25 and T30 is a necessity.


Torx

Unassembled — Ordering number

With transparent window door — **5284 1935-F *)**

*) In addition to the material in 5284 1935-C the material set 5284 1935-F include also:

Qty	Name	Ordering number
3	Door 4U	5284 1342-Y
6	Hinge half	2184 0512-1
3	Lock stop	2167 247-3

Equipment frame 12U 60C with support frame

With support frame for mounting of Relay assemblies with apparatus bars

Available as unassembled, only

Note: For assembly of additional terminal bases
Or mounting of apparatus plates, the apparatus bars is to be mounted

Unassembled

Ordering number

Without door **5284 1935-G**

Consisting of following material:

Qty	Name	Ordering number
3	Apparatus frame	5284 1340-A
2	End panels	2167 138-8
3	Marking strip	5284 1509-A
3	Set of screws	5284 1935-N *) Note!)

*) see earlier page

Qty	Data	Type
4	M6x10	Torx thread forming screw
6	M5x6	Torx
2	2,5x5	Cross rec. tapping rivet (for the rack label)
1	3,5x6,5	Torx pan head tapping screw
4	M4x8	Torx pan head tapping screw

Note!)

For assembly of frames, screw drivers type Torx, T10, T20, T25 and T30 is a necessity.


Torx

Unassembled

Ordering number

With transparent window door **5284 1935-M *)**

*) In addition to the material in 5284 1935-G the material set 5284 1935-M include also:

Qty	Name	Article number
3	Door 4U	5284 1342-Y
6	Hinge half	2184 0512-1
3	Lock stop	2167 247-3

Accessories for 19" equipment frames, height 4U and 8U

Name	Size	Ordering number
Strengthening plate To be fixed to top and bottom of the equipment frame. Two plates required per rack.	60C	1MRK 000 588-2

Note: Recommended for earthquake and the vibration prone areas e.g. ships, trains etc, etc

1U extra space between racks is a necessity

Apparatus frame	4U 60C	5284 1340-A

Support frame	4U 60C	5284 1340-C

Mounting brackets for mounting to the rear plane 195-2 If mounting to the rear (back) plane in e.g. a cubicle is needed, these mounting brackets are to be mounted to the apparatus or support frames instead of the end panels.	4U	2 x	2174 195-1
	8U	2 x	2174
	12U	2 x	2174 195-3

To get a holding montage of the frame.	one	2174 195-1 and
Applicable only for a 4U equipment frame.	one	2174 195-10 is provided

Door with transparent window, 4U 60C

To be ordered in parts in the following way:

Door	5284 1342-Y
Hinge 2 halfs are needed for each door	2184 0512-1
Lock	2167 247-3

Marking bar Marking 01-60 To be fixed to the top of upper bar of the apparatus- or support frame. Two fixing plugs are enclosed in the delivery	5284 1509-A

Screw drivers type Torx

T10	1MRK 000 436-3
T15	1MRK 000 436-7
T20	1MRK 000 436-4
T25	1MRK 000 436-5
T30	1MRK 000 436-6

Apparatus bars

Purpose
Used for construction of relay sub-assemblies that belong to same apparatus group. This option is used for example two or more protective relays needs to be mounted in the same equipment frame with support frame.

How many bars are needed?
The terminal bases for plug-in modules included in the group are always mounted to a couple (2) of apparatus bars.

The construction of the bars
These U-shaped have the holes of 3,2 mm at a distance equivalent to one C module (7 mm).

Available lengths
The bars are available in various lengths (see the ordering number here beside).

Fastening of the terminal bases to the bars
Suitable screw to fix the terminal bases to the apparatus bars is ST 3,5 x 13 tapping screw.

Length	Ordering number
60C	2175 323-5
48C	2175 323-10
42C	2175 323-9
36C	2175 323-3
30C	2175 323-6
24C	2175 323-2
18C	2175 323-8
12C	2175 323-1
6C	2175 323-7

4U apparatus plates

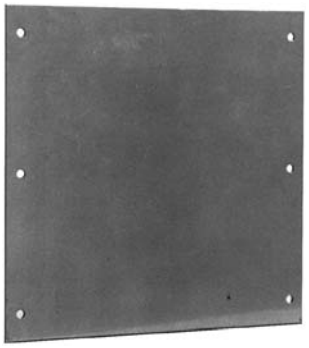
Purpose
1. Used to support of apparatus, which can't be inserted in the terminal bases. For example, transformers and resistors can be mounted on the plate.

2. The plates can also be used to cover an unutilized space in the equipment frame.
Authors note: The plates can be used to cover an unutilized space, but considering future needs the terminal bases could also be used to cover unutilized space.

What type?
There are 2 types of plates, depending on if the plate will be fixed to apparatus frames/bars or support frames.

Available sizes
Several widths are available; see the table of ordering numbers here beside.

Mounting on the frames
a) To a apparatus frame:
With the ST3 5x9,5 mm tapping screw
b) To support frame:
Only the plates 6C, 18C, 30C and 42C can be directly mounted to the support frame. The others can also be used, but:
Prior montage to the support frame the plate shall be fasten to apparatus bars and subsequently fixed to support frame with the ST3,5x13 mm tapping screw .



Can be mounted on the **apparatus** bars/frames

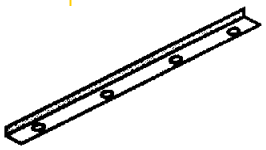
Width	Ordering number
60C	2172 467-15
48C	2172 467-12
42C	2172 467-19
36C	2172 467-9
30C	2172 467-18
24C	2172 467-6
18C	2172 467-17
12C	2172 467-3
6C	2172 467-16

Suitable widths (depending on the hole distance) to be mounted directly to **support** frames

Width	Ordering number
42C	2172 467-19
30C	2172 467-18
18C	2172 467-17
6C	2172 467-16

A reinforcement bar for 60C apparatus plates for 19" frames when mounting heavy equipment on the plate, is also available.

Ordering number: 9106 518-3



Chapter 4 Case mounting

About this chapter
This chapter describes three different cases for panel mounting.

RHGP cases for panel mounting

The RHGP is one of the types in our case family, and permits an easy, rapid and cost effective panel mounting of single COMBIFLEX relays or COMBIFLEX relay assemblies (apparatus groups).

Features:

- **RHGP 4B cases permits mounting of COMBIFLEX relay modules in cut-outs of same size as the earlier BBC/ABB 900 Modules series relays.**
- **RHGP case also permits easy and rapid mounting of all sizes of RTPX test switches.**
- **The cases can be ordered with or without a front cover.**
- **The front cover provides polycarbonate transparent window.**

Application:

RHGP 1 Applicable for 1 one-seat relay module (2U6C) on a terminal base RX1 or for a RTXP 8 test switch module.

RHGP 2 Applicable for 1 two-seat relay module (2U12C) or for 2 one-seat relay modules of (2U6C) on a terminal base RX2.

RHGP 2H Applicable for 1 type 2H –seat relay module (4U6C) or for 2 one-seat relay modules of (2U6C) on a terminal base RX2H or for a RTXP 18 test switch module.

RHGP 4 Applicable for 1 four-seat relay module (4U12C) or for 2 type 2H-seat relay modules (4U6C) or for 4 one-seat relay modules (2U6C) on a terminal base RX4 or for a RTXP 24 test switch module.

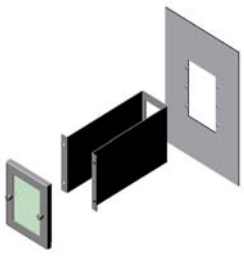
RHGP 4B*) Applicable for same sizes of relay modules as in RHGP 4.

***)Please note that the:**
Cut-out dimension is different compared to RHGP 4. It is adapted for mounting in same cut-out space as the earlier BBC/ABB 900 Modules series, size 1 relays.

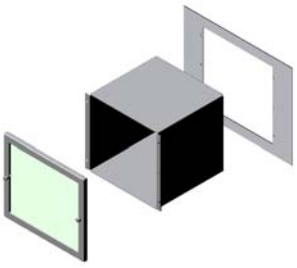
RHGP 8 Applicable to mount a relay assembly (apparatus group) of size 4U 24C on apparatus bars or a number of relay modules directly mounted on the terminal bases RX4 or RX2H.

RHGP cases are applicable for test switches of type RTXP 8, RTXP 18, and RTXP 24. Terminal bases are not required for the mounting of the test switches. A mounting kit is required for the mounting of RTXP 24. A mounting bracket is required for mounting of RTXP 8 in 4U cases (see ordering information).

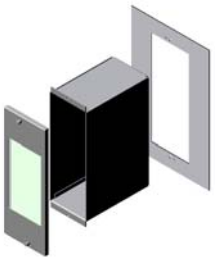
RHGP can be ordered with or without a front cover. The front cover provides a dust protected (IP50) installation.



RHGP 1

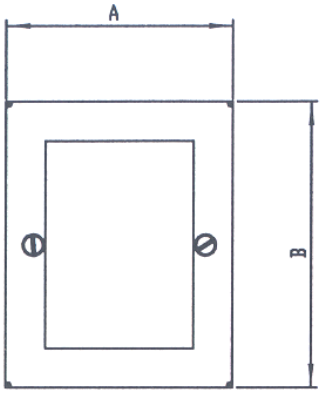


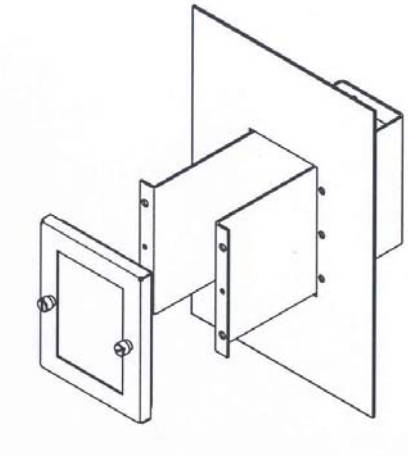
RHGP 8

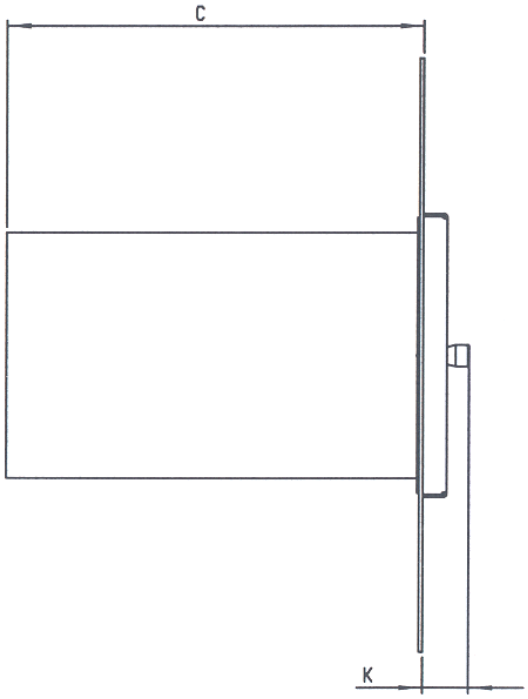


RHGP 2H

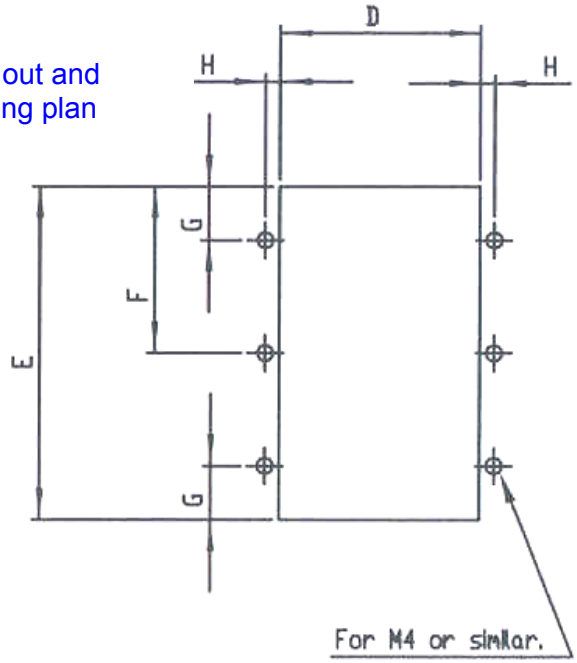
Dimensions:







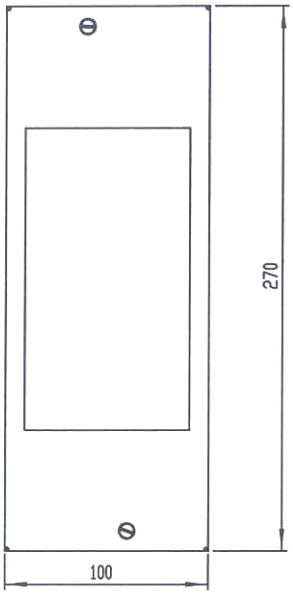
Cut out and drilling plan

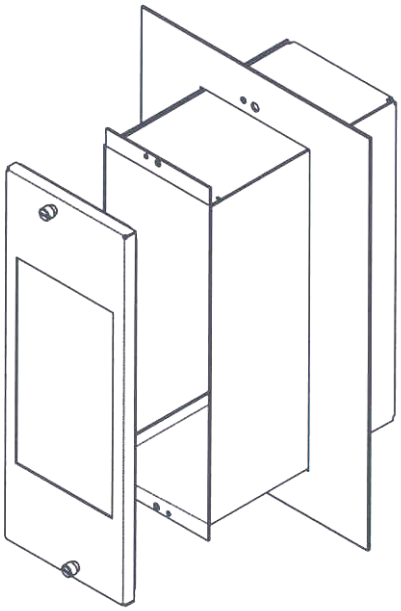


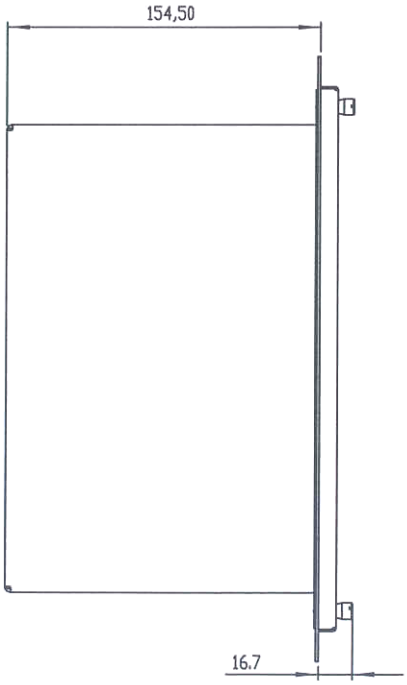
Type	Measure								
	A	B	C	D	E	F	G	H	K
RHGP 1	84	105	154.5	56	93	46.5	15	4	16.7
RHGP 2	126	105	154.5	98	93	46.5	15		
RHGP 2H	84	182	154.5	56	170	85	21.5		
RHGP 4	131	182	154.5	103	170	85	21.5		
RHGP 8	210	187	175	182	175	87.5	21.5		

Cont. RHGP 4B

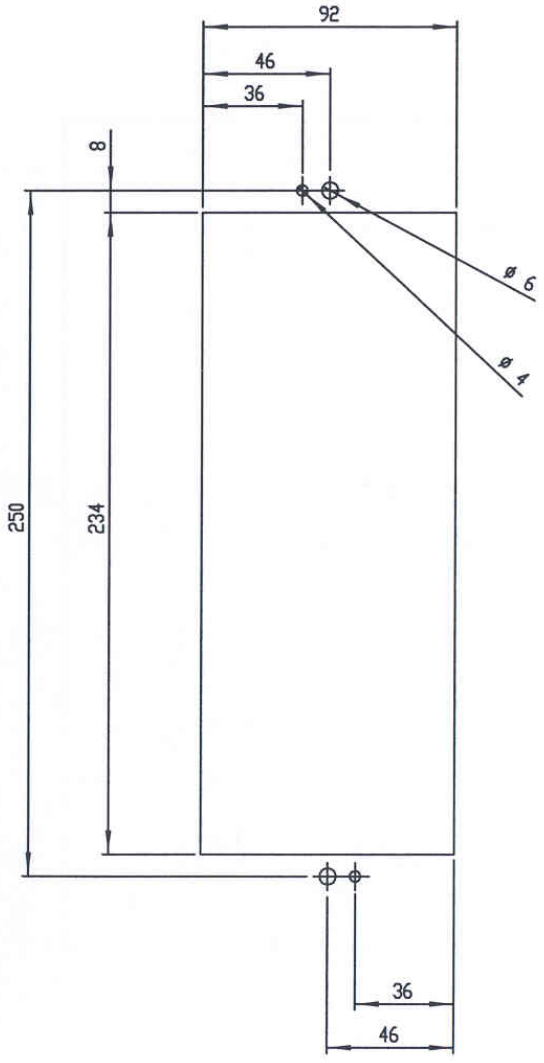
RHGP 4B







Cut out and drilling plan



Design:

The RHGP cases are made of steel sheets and painted in ABB standard light beige colour, code NCS 1704-115R. RHGP 4B and RHGP 8 are fully enfolded.

The top and the bottom part of RHGP 1, 2, 2H and 4 are not covered in order to obtain better air circulation.

The cases are to be inserted and fasten with 4 mm*xx screws + nuts in the cut-out from the front side of any panel.
Terminal base and test witches are to be mounted directly to the rear of the cases.
The front covers are made of light beige coloured sheet of steel and provided with a transparent polycarbonate plastic window.
The front covers are mounted to the case with two captive screws. There is a gasket at the rear of the front cover for protection against dust. (IP50)

Ordering:

Type	Size	Description	Ordering No.
RHGP 1	**2U6C**	**Case with front cover**	**1MRK 001 913-AA**
		Only case	**1MRK 001 914-1**
		Only front cover	**1MRK 001 913-AB**
RHGP 2	**2U12C**	**Case with front cover**	**1MRK 001 913-BA**
		Only case	**1MRK 001 914-4**
		Only front cover	**1MRK 001 913-BB**
RHGP 2H	**4U6C**	**Case with front cover**	**1MRK 001 913-CA**
		Only case	**1MRK 001 914-7**
		Only front cover	**1MRK 001 913-CB**
RHGP 4	**4U12C**	**Case with front cover**	**1MRK 001 913-DA**
		Only case	**1MRK 001 914-10**
		Only front cover	**1MRK 001 913-DB**
RHGP 4B	**4U12C*)**	**Case with front cover**	**1MRK 001 913-FA**
		Only case	**1MRK 001 914-16**
		Only front cover	**1MRK 001 913-FB**
RHGP 8	**4U24C**	**Case with front cover**	**1MRK 001 913-EA**
		Only case	**1MRK 001 914-13**
		Only front cover	**1MRK 001 913-EB**
	4U60C	**Under development**	

Mounting Kit for mounting of RTXP 24 in 4U cases	**1MRK 000 020-BT**
Mounting Kit for mounting of RTXP 8 in 4U cases	**1MRK 000 316-19**

***) Adapted for the mounting in same panel cut-out as the earlier 900-series relays made in ABB Switzerland (former BBC)**

RHGS case for surface mounting or 19″ panel mounting

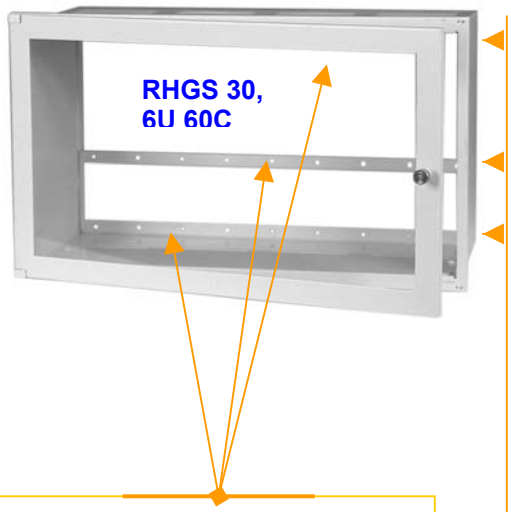
The RHGS, 6U high cases are one type of cases in our COMBIFLEX modular mounting system and RHGS 6 and 12 cases can also be combined with the 500 and 670 series protection terminals.
The RHGS case is adapted for different mounting needs and available mounting accessories gives maximum flexibility regarding the mounting methods.

The widths of C12, C24 and C60 are available.

RHGS can be mounted to19″ hinge frame cubicle, flush or semi-flush mounted panels, or side by side mounted.

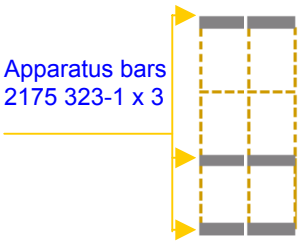
The available colour of the case at present is beige.

RHGS cases can't be ordered unassembled



Prior mounting of COMBIFLEX© terminal bases to the case, apparatus bars 6C, 12C or 60C, depend upon to the size of case, are to be mounted to each supporting rails and fasten with **ST 3,5x13 mm tapping screws**.

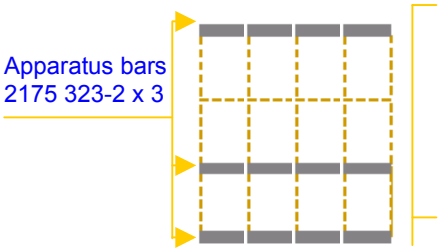
RHGS 6 6U 12C **Example of included modules:**



Upper part:
Alt. 1. 1 **x** RX4 Terminal base (5619 499-A) **or** max. 2 **x** RX2H (5619 625-A)
Alt. 2. 1 **x** RX2H terminal base combined with 1 **x** RTXP 18 test switch(RK 926 115-xx)
Alt. 3. 2 x RTXP 18 test switch(RK 926 115-xx) or 1 **x** RTXP24 test switch (RK 926 315-xx)

Lower part:
Alt. 1. 2 **x** RX1 (5619 622-A) or 1 **x** RX2 (5619 483-A) Terminal bases
Alt. 2. 2 **x** RTXP 8 test switches (RK 926 002-xx)

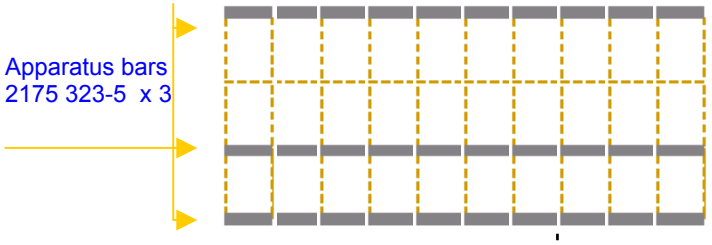
RHGS 12, 6U 24C **Example of included modules:**



Upper part:
Alt. 1. 2 x RX4 Terminal bases (5619 499-A) max 2 **or** 8 x RX2H Terminal bases (5619 625-A)
Alt. 2. Combined RX2H and RX4 terminal bases and/or Max 4 x Test switches type RTXP 18 (RK 926 115-xx) Max 1 x RTXP 24 RK 926 315-xx (mounting kit :1MRK000020-BT is needed)

Lower part:
Alt. 1. Max 4 x RX1 (5619 622-A) or max 2 x RX2 (5619 483-A) Terminal bases
Alt. 2. Max 4 x RTXP 8 test switches (RK 926 002-xx)

RHGS 30, 6U 60C **Example of included modules:**



Upper part:
Alt. 1. Max 5 x RX4 Terminal bases (5619 499-A) **or** 10 x RX2H Terminal bases (5619 625-A) **or** combined RX2H and RX4 terminal bases and/or
Alt. 2. Max. 10 x test switches type RTXP 18 (RK 926 115-xx) **or** max. 3 x RTXP 24 (RK 926 315-xx)

Lower part:
Alt. 1. Max. 5 x RX2 Terminal bases (5619 483-A) **or** Max. 10 x RTXP 8 test switches (RK 926 002-xx)

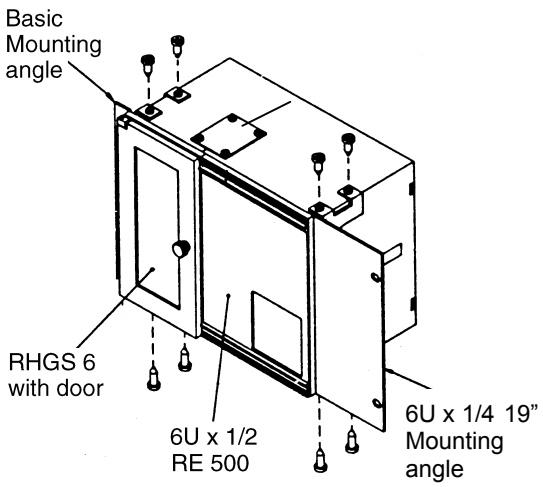
Ordering numbers on the available sizes

Type	Size	No. of relay seats	Ordering numbers Without door	With door	Fitting app. bar
RHGS 30	6U 19"	30	1MRK 000 315-A	1MRK 000 315-D	2175 323-5
RHGS 12	6U ½ of 19"	12	1MRK 000 315-B	1MRK 000 315-E	2175 323-2
RHGS 6	6U ¼ of 19"	6	1MRK 000 315-C	1MRK 000 315-F	2175 323-1
Door for RHGS 6			Ordering no	1MRK 000315-AB	

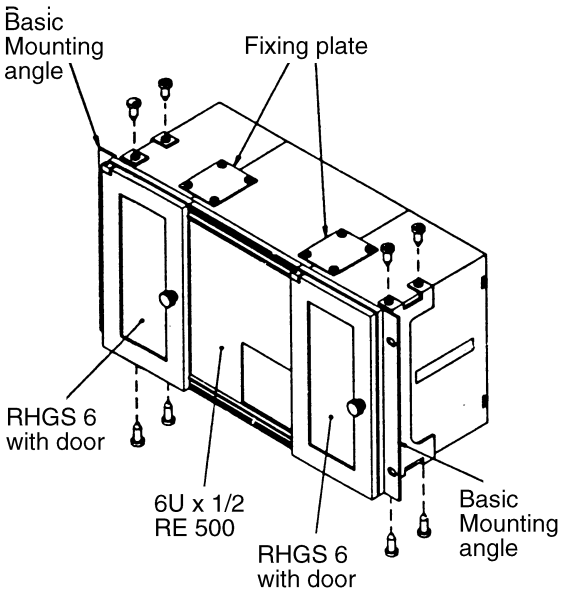
Note: Terminal bases and Apparatus bars are to be ordered separately

Examples of different mounting RHGS cases and combinations with 500 series cases :

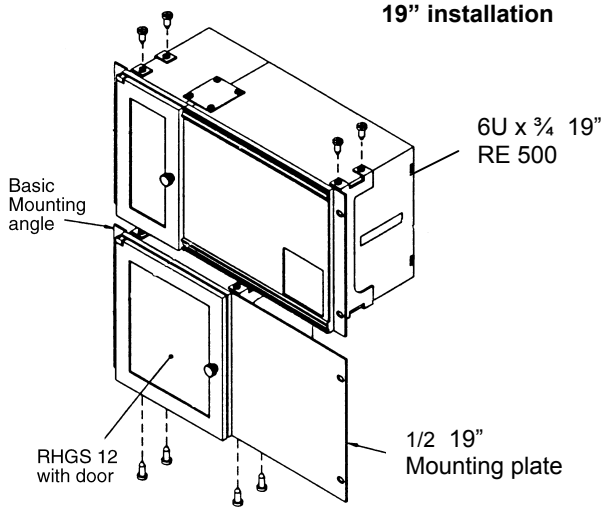
19" installation

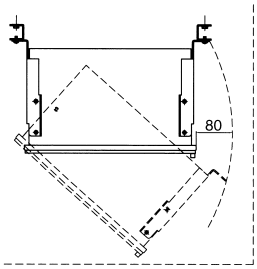


19" installation

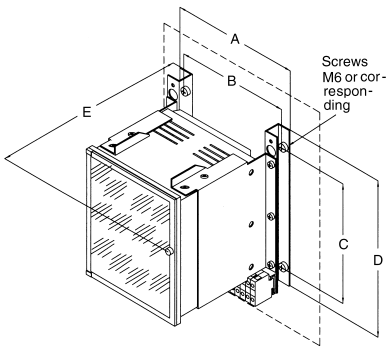


19" installation





Wall mounting

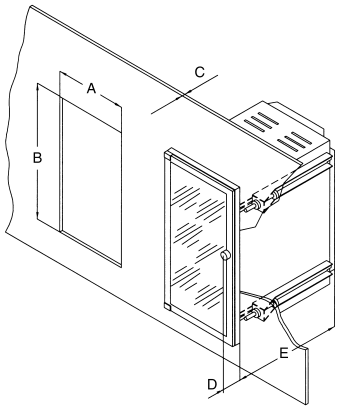


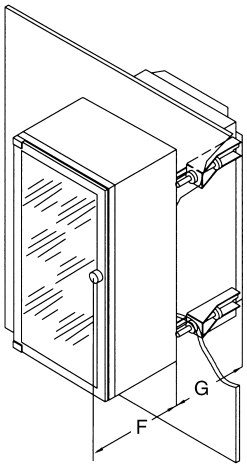
Wall mounting

Case size	A	B	C	D
RHGS 6	179,7	154,8	272,8	390
RHGS 12	292	267,1		
RHGS 30	516	491,1		

Flush mounting

Semi-flush mounting





C = 4-10 mm

D = 32,5 mm (excl. knob 16,5 mm)

E = 190 mm
234 mm with protective rear cover *)

F = 125 mm (excl. knob 109 mm)

G = 100,2 mm
144,2 mm with protective rear cover*)

Cut-out dimensions:

	A ± 1	B ± 1 *Note
RHGS 6	97,8	254,3
RHGS 12	210,1	
RHGS 24	434,7	
Side by side with 500 series	See dimensions drawings for 500 series	259,3

*Note: With mounting of combination side by side mounting of RHGS's cases or 500 series case the cut-out dimension **B** must be **259,3 mm**.

Following accessories are available for different kinds of installations of RHGS cases

	Description	For case size	Ordering number
Alt 1.	**Mounting kit for 19" installation:** Consisting of two (2) fitting mounting angles. Set of screws and assembly instruction are enclosed in the delivery.	RHGS 30 RHGS 12+RHGS 6 RHGS 12 RHGS 6	1MRK 000 020-CA 1MRK 000 020-BA 1MRK 000 020-BB 1MRK 000 020-BE
Alt 2.	**Mounting kit for flush installation:** Consist of four (4) fasteners, and a sealing strip. Set of screws and assembly instruction are enclosed in the delivery.	All sizes	1MRK 000 020-Y
Alt 3.	**Mounting kit for semi-flush installation:** Consist besides the same parts as in kit for flush installation but also a distance frame. Set of screws and assembly instruction are enclosed in the delivery.	RHGS 30 RHGS 12 RHGS 6	1MRK 000 020-AK 1MRK 000 020-AM 1MRK 000 020-AP
Alt 4.	**Mounting kit for wall-mounting:** Consisting of two (2) mounting angles and two (2) mounting bars. Set of screws and assembly instruction are enclosed in the delivery.	All sizes	1MRK 000 020-DA
Alt 5.	**Mounting kit for side-by-side installation: Note** Consist of two (2) fixing plates. Set of screws and assembly instruction are enclosed in the delivery.	All sizes	1MRK 000 020-Z
Alt 6.	***) Protection for rear area:** Consisting of a sheet of steel with a slot for cable entrance at the bottom part. Set of screws and assembly instruction are enclosed in the delivery.	RHGS 30 RHGS 12 RHGS 6	1MRK 000 020-AA 1MRK 000 020-AC 1MRK 000 020-AE

Note:
Kit 1MRK 000 020-Z is only to connect two (2) cases together, side-by-side.
For installation to 19", besides the kit 1MRK 000 020-Z, a fitting kit for the total width, according to Alt.1 on the table above is also to be ordered.

RHGX cases for panel mounting

Cases of RHGX type for flush- or semi-flush mounting in panel cut-outs
(Not for 19" rack mounting)

The type RHGX cases are available in five (5) sizes. The case is a box made of steel sheet. Painted as standard, with ABB light beige colour, code NCS 1704-I15R. It is open at the back and has a flange, which acts as a stop when the case inserts into front panel. The flange has a sealing strip of rubber at the back side for tight montage into the front panel. All RHGX cases are equipped with a door with transparent window at the front.
The cases are equipped with a support frame at the rear side of the case and terminal bases and apparatus bars shall be mounted on the apparatus bars prior assembling to the case.
The assemblies (apparatus groups) on apparatus bars shall be fasten with the screws ST3,5x9,5 from the rear side of the case.

For mounting in a panel fixing details are included in delivery, see figure A and B

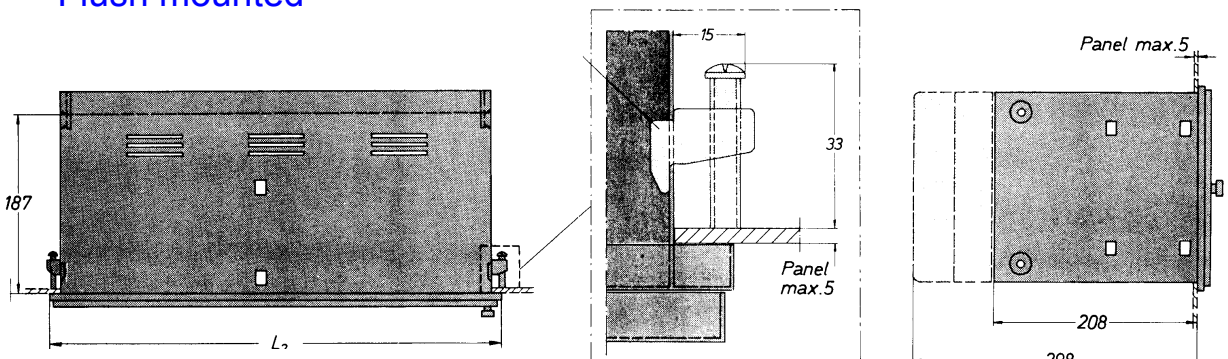
Available case dimensions and suitable apparatus bars

Case type	Size	L	L_1	L_2	Ordering No.	Suitable apparatus bar	
RHGX 4	4U 12C	132	110	135,5	RK 927 001-AB	2175 323-1	(x 2)
RHGX 8	4U 24C	216	194	219,5	RK 927 002-AB	2175 323-2	(x 2)
RHGX 12	4U 36C	300	278	303,5	RK 927 003-AB	2175 323-3	(x 2)
RHGX 20	4U 60C	468	446	471,5	RK 927 004-AB	2175 323-5	(x 2)
RHGX 40	8U 60C	468	446	471,5	RK 927 017-AB	2175 323-5	(x 4)

Dimensions in mm

Fig A

Flush mounted

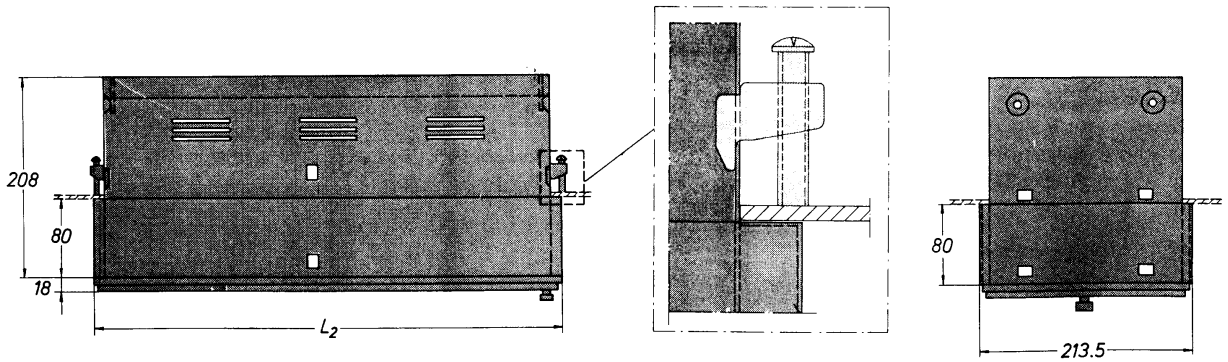


Upper view

Side view

Semi-flush mounted

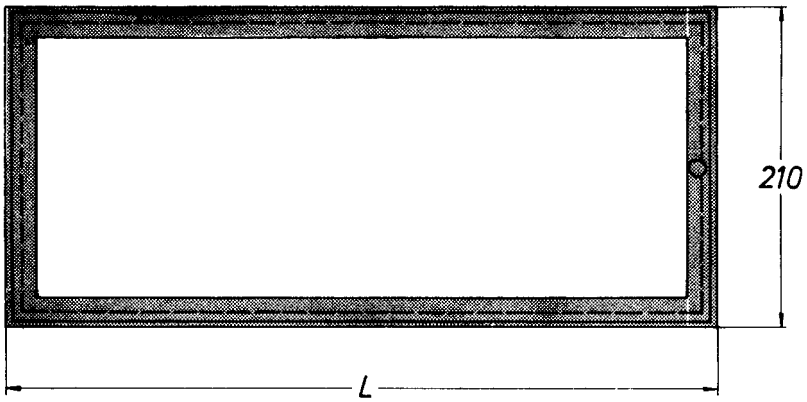
Fig B



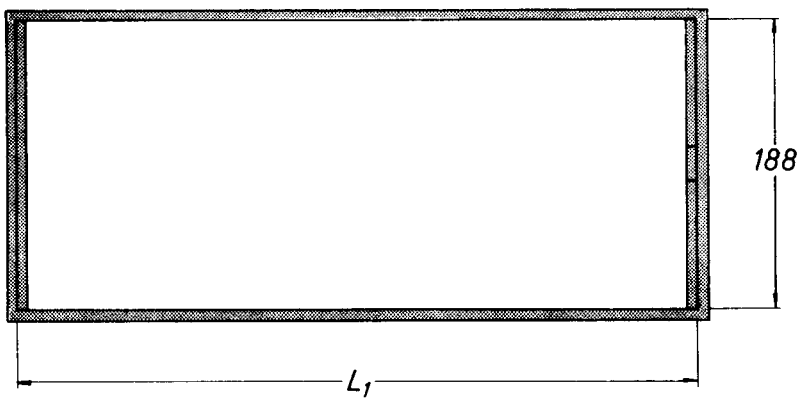
Upper view

Spacer frame

Side view



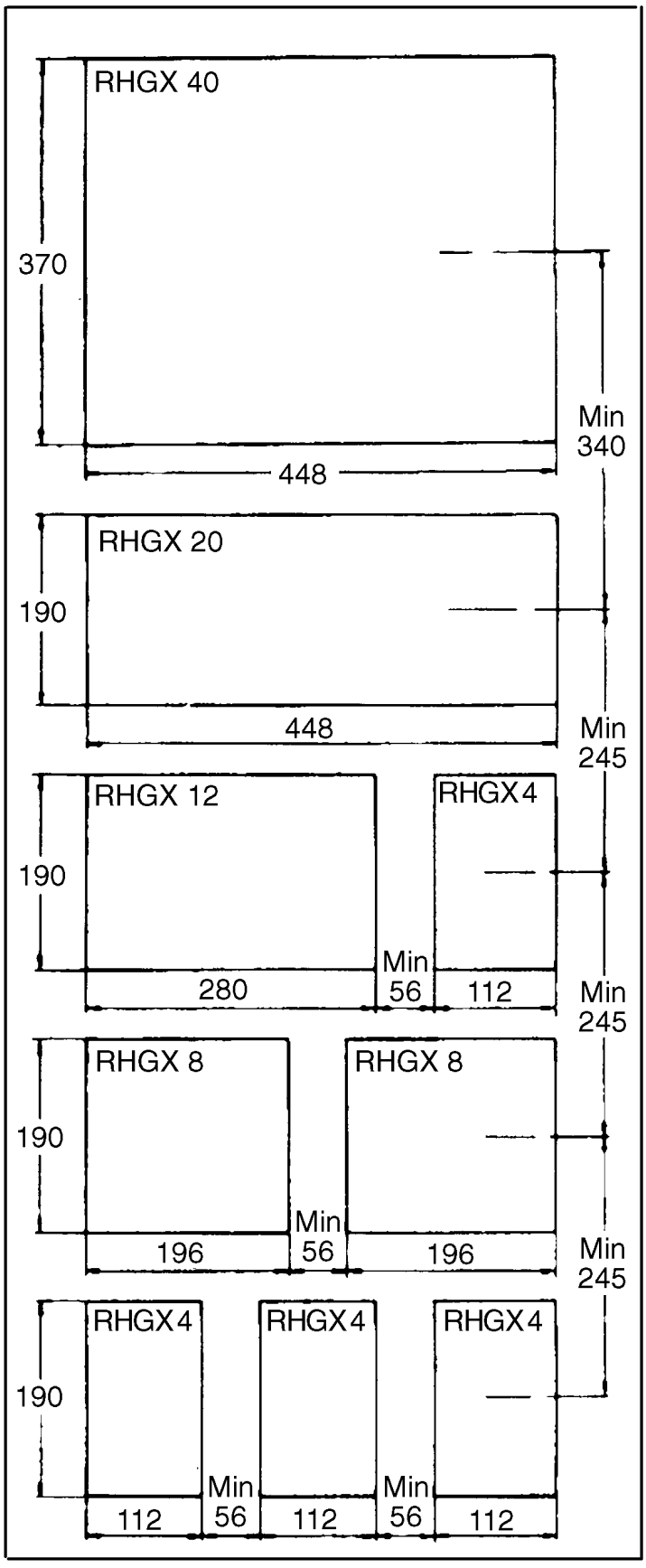
Front view



Rear view

Cut-out dimensions for RGHX cases in mm

Flush and semi-flush mounting



Chapter 5 Crimping of CX-terminals

About this chapter
This chapter describes the COMBIFLEX® crimping tool and explains how to use it.

Note : **All crimping of COMBIFLEX terminal contacts; pins and sockets shall be made in accordance with this Inspection Provision; 2084007-1; see following pages.**

1 Summary

This Technical provision is valid for the performing of contact crimping of the components below onto cables of the types V-K and X-K with hand tools 1MRK 001593-1 as well as with electrical crimping tool 1MRK 002011-A. The cable has a tinplated and annealed copper conductor.

2658 634: Contact socket for 10 A max continuous current load

2658 636: Contact socket for 20 A max continuous current load

2658 637: Contact pin for 10 A max continuous current load

2658 638: Contact pin for 20 A max continuous current load

Note l: For cables not accounted shall contact crimping and tension strength test be done.

Note 2: Explanation of the designation of cables according to point l:

(Ref. CENELEC HD 21.3)

1st letter: V = PVC-insulated

X = Cross-linked polyolefin insulated

2nd letter: K = Extra multi-stranded flexible conductor class 5 (for fixed installation)

2 General provisions

2.1 Component (Contact socket or pin)

No oxide nor any pollutant should be found inside the component. The surface finish should be intact. There should be no visible cracks. The component should be straight. Damaged components should be discarded. Make sure that the component is placed in a correct position in the tool.

The component should not be heated (for example by soldering) after the contact crimping has been carried out, as this may deteriorate the quality of the connection.

2.2 Cable

At hand-operated insertion of the cable into the component, the stripping length should be 10.5 ± 0.5 mm. Suitable pliers for manual stripping: RK 924 034-AA.

At mechanical insertion, the stripping length should be adjusted so that at least 8,5 mm stripped length will be inserted into the section for contact crimping. The zone with visible strands should be 0.2-1.8 mm (Figure 3).

After the stripping, no indications of fractured or broken strands should be found. All strands of the conductor should be inserted into the contact crimping part of the component.

The maximum outside diameter for a cable to a 10 A socket is 3,7 mm and to a 20 A socket 4,2 mm.

When contact crimping two cables in the same component, there should be a maximum area of 0,5 mm^2 for 10 A components and 0,75 mm^2 for 20 A components.

More than two cables in the same component should be avoided.

Electrical press Contact crimping	Electrical press Tool	Pliers	Cross section area (mm^2)	AWG	Tensile force (N)	Component
1MRK 002011-A	1MRK 002013-1	1MRK 001593-1	0,25 0,5 0,75 1,0 1,5	23-15	⟨37,5 ⟨75 ⟨112 ⟨150 ⟨225	Contact socket: 2658 634 Contact pin: 2658 637
	1MRK 002013-2					
	1MRK 002013-3		1,5 2,5	15-13	⟨225 ⟨375	Contact socket: 2658 636 Contact pin: 2658 638

Table 1

Permitted conductor areas, see table l. The tension strength of a contact crimped connection should be at least 150 N/mm^2.

The adequate cable length for a tension test is approximately 100 mm.

2.3 Tools

Choose the right tool with regard to the component and the size of the production series according to table l.

The tools should be handled carefully. Check that there are no residues of the coating (gold, silver, copper) on the press jaws.

Only tools, which are controlled and checked by ABB Automation Technologies or by of them authorized representative, should be used

Hand tools have marking plates with the article number, the range for cable areas as well as instructions on the position of the contact socket in the tool. The tool should be regularly checked.

Pliers (manual tool) 1MRK 001593-1 as well as electrical crimping tool 1MRK 002013-A is adjusted for correct crimping force at different conductor areas. This enables the crimping of conductor areas between 0.25-2.5 mm^2 without exchanging the crimping force.
OBS! Pliers 1MRK 001593-1 must be adjusted for 0,25 mm^2 cable. (See below.)

3 How to carry out contact crimping

3.1 With electrical press 1MRK 002011-A

Strip the cable.

Place the component into the guiding hole of the tool until it reaches the stop (the component bottoms to the flange).

When crimping socket the insulation support of the socket shall be turned down. In this way the joint, longitudinal to the socket, is also turned down and the crimping takes place with two crimping zones perpendicular to the joint.

The crimping should be symmetrical in relation to the joint of the socket. See figure 4. Otherwise, the resistance to tension deteriorates considerably.

Insert the stripped cable into the component towards the stop. Keep the cable in position and carry out the contact crimping until the bar is released. The strands should be visible according to figure 3.

The component must not be bent when crimped. See figure 5.

3.2 With contact crimping pliers 1MRK 001593-1

Strip the cable.

Open the tool complete1y.

When crimping sockets: Push the 1ocking device on the 1ocator and rest it against the flange, remove 1ocking devise for sockets right position.

When crimping pins: Insert the pin against the flange.

Insert the stripped end firmly of the lead into the correct position.

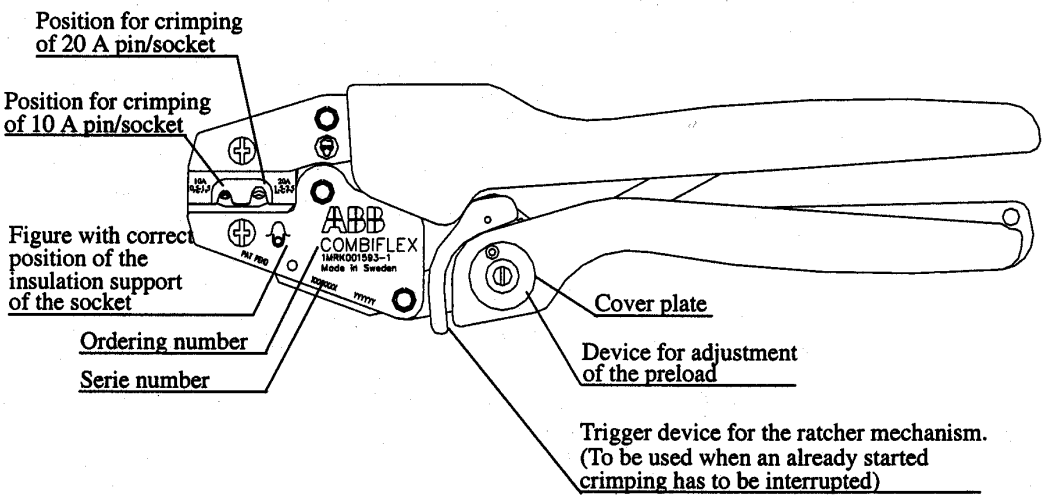
Hold the lead firmly, and squeeze the pliers handles until the release latch disengages.

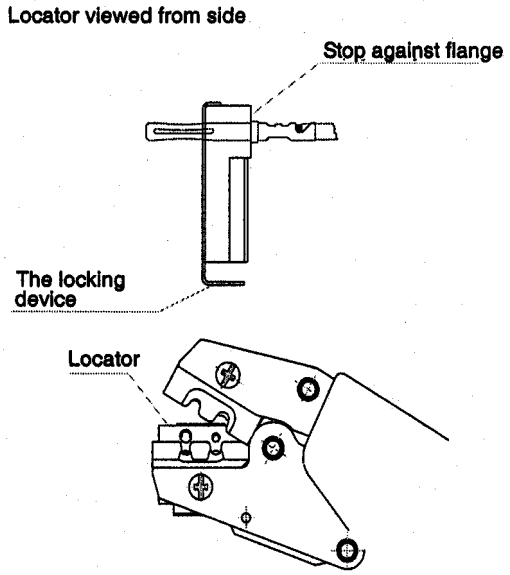
When crimping sockets: Remove the locking device on the locator and remove the connection. The crimping should be symmetrical in relation to the joint of the socket. See figure 4.

When crimping pins: Remove the connection from the pliers.

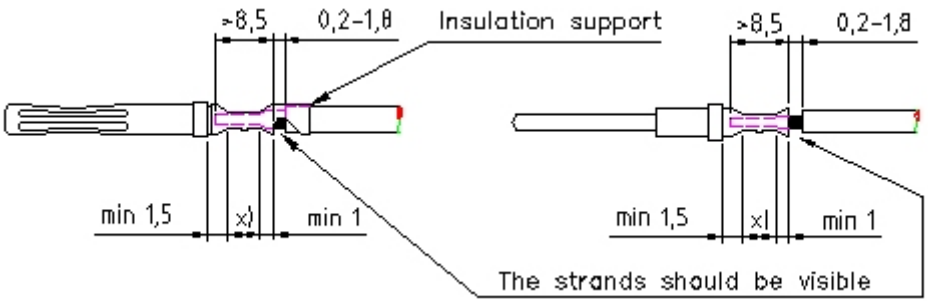
Check the finished connection. The socket/pin must not be bent. See figure 5.

When using 0,25 mm^2 cable in 10 A outlet its necessary to remove setting wheel and adjust from setting position 1 to5.





4 Check list for crimped connections



x) Area where the contact crimping is to be carried out

Fig. 3

The contact crimping should be symmetrical in relation to the joint of contact socket. Permitted deviation 60.5 mm. See figure 4.

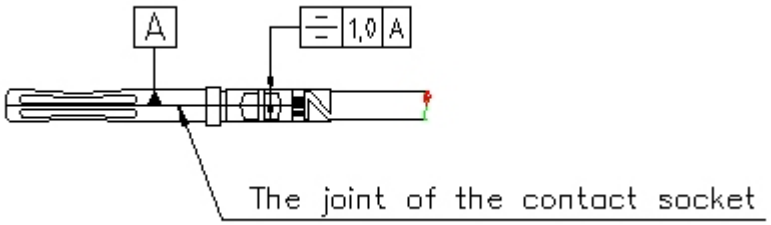


Fig 4

The crimping should not bend the contact socket and contact pin. Maximum permitted deviation from straightness according to figure 5.

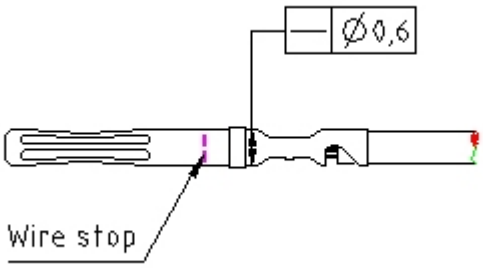


Fig. 5

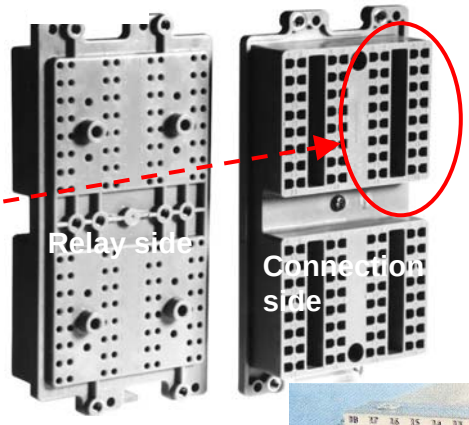
Chapter 6 Connection and installation components

About this chapter
This chapter describes how to connect and install components.

Connection and installation components

For each relay module seat, 16 double 10 A terminals are provided.

Fig 1.



Lead locking clips details
x16

Fig 2.

Fig 3.

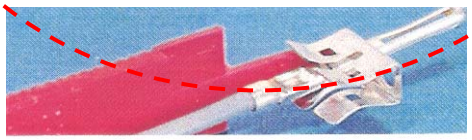
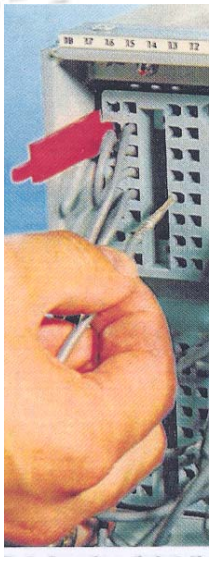


Fig 4.

Lead to be removed from the terminal base:
The Extractor RTXD is used to open the locking clips to permit removal of a connected lead.

Fig 5.



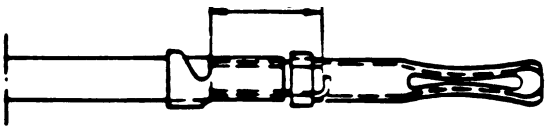
Connections between plug-in units on the Terminal bases or from the Terminal bases to the Terminal blocks are made with socket-equipped plug-in leads.
Electrical connections are made "directly" from the male terminal pin of the relay unit to the female socket crimped to the lead. See figure 6.
The pins are normally connected in pairs inside the relay unit, which permits branching of each electrical point.

Fig 6.

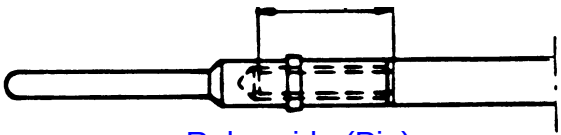
10,5 ±0,5

Principle illustration

10,5 ±0,5



Socket equipped lead



Relay side (Pin)

Please note that: Selection of 10 or 20 A socket is not depending on the conductors cross section area, but solely depending on the bearing capacity and size of the pin/contact to be connected. E.g. all AC circuits in the Protective relays are designed for 20A.
Both 10 and 20A type of sockets have on the other hand limitation regarding the cross section area of the leads respects to min. and max. of the crimping capacity.

Connection method

The method of connection with socket-equipped leads is used for all COMBIFLEX parts which contain locking clips. Figure1, figure 2, figure 3 and figure 4 illustrates this principle. When the socket-equipped lead is be inserted into the Terminal base, see figure 5, where a plug-in unit is, or is to be inserted, the socket will enclose the pin on the plug-in unit and be hold in place by the locking clip in the Terminal base, see figure 3.
The inserted, socket-equipped lead can only be removed from the Terminal base by means of a clip-widening tool, an extractor type RTXD, see figure 4.
This method of connection is both rapid and reliable. Pins, sockets and locking clips are protected against inadvertent contact and the tensile strength of the joint between socket and lead is exceptionally high.

RTXK and RTXI current connectors

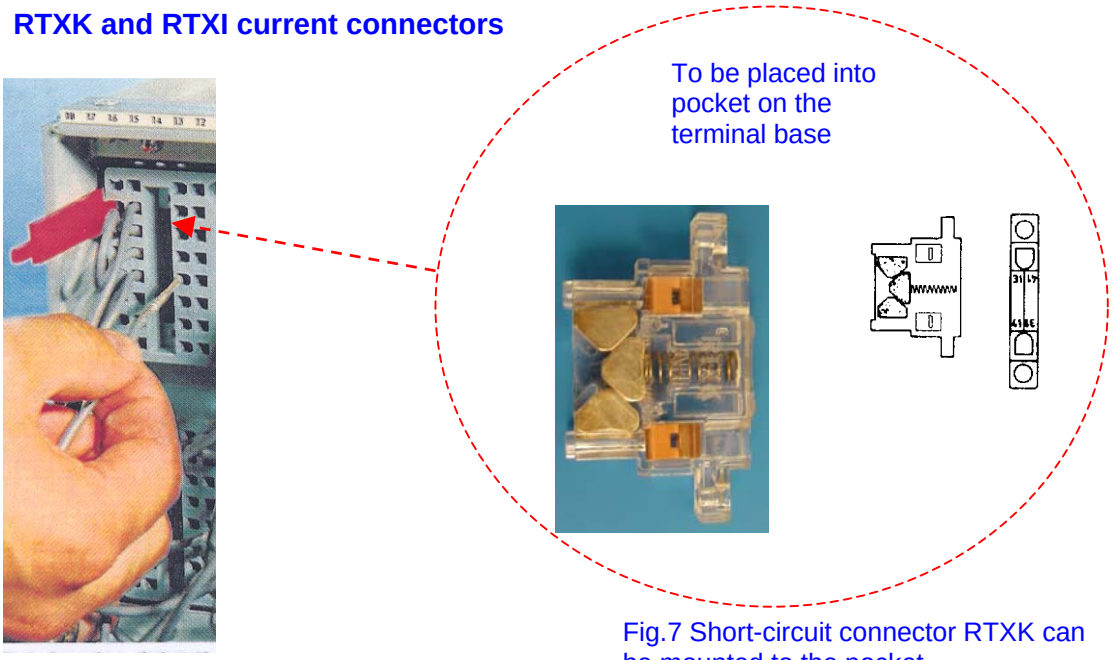
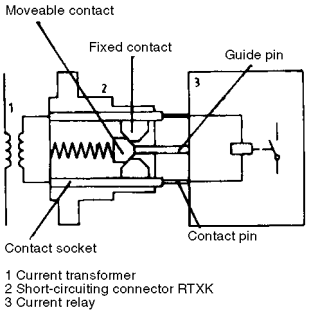


Fig.7 Short-circuit connector RTXK can be mounted to the pocket

Each Terminal base which accepts AC current circuits is to be equipped with a **RTXK short-circuiting connector** (enclosed in the delivery of AC current relays).
The RTXK transparent plastic short-circuiting connector, see figure 7, contains two fixed contacts with 20 A terminals and one movable contact. When the current relay module is plugged into the terminal base, will the contact pins on the relay be connected to the contact socket in RTXK before the guide pin on the module depresses the spring-loaded contact so that the circuit is opened.



1 Current transformer
2 Short-circuiting connector RTXK
3 Current relay

Fig.8 Connections to the short-circuiting connector RTXK

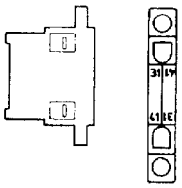
Cont.

When the relay unit is withdrawn from the terminal base, the current circuit is short-circuited before the relay module is disconnected, see figure 8. The RTXK is mainly used in AC circuits for short-circuiting a CT secondary circuit when the relay module is removed from the terminal base.

The RTXI gray plastic shunt connector, see figure 9, which has two 20 A terminals provides for the connection of 20 A socket leads to terminal base-mounted DC current modules. When the relay module is with-drawn from the terminal base, the current circuit is opened. The RTXI is mainly used in DC shunt circuits and is designed be mounted into the pocket on the rear side of the terminal base.

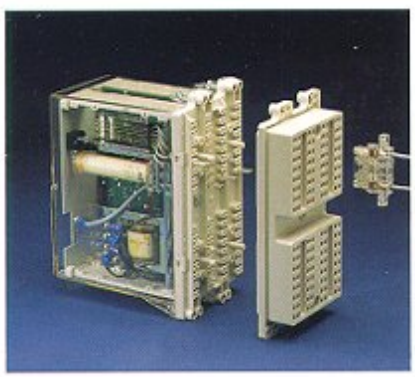
The RTXI connector is always enclosed in the delivery of relay, designed for DC circuit.

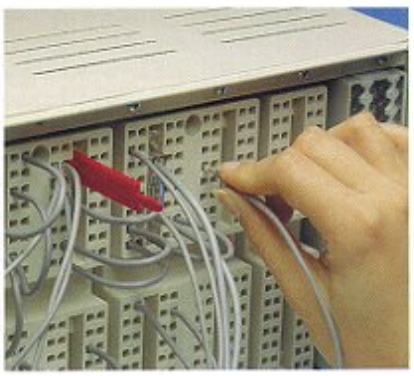
Fig. 9

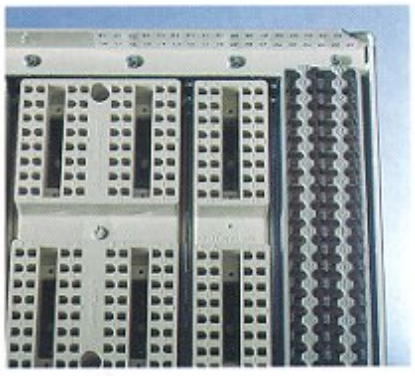


Ordering numbers for articles mentioned in section above

Type	Ordering number	Weight/item
Contact socket 10A in package with 100 pcs 50 g *) For conductor area 0,25 – 1,5 mm²	1MRK 002 136-A	2658 634-1
Contact socket 20 A in package with 100 pcs 90 g *) For conductor area 1,5– 2,5 mm²	1MRK 002 136-D	
Crimping pliers For crimping of 10 A and 20 A contact sockets	1MRK 001 593-1	680 g
RTXD Extractor for with-drawing of 10 A and 20 A contact socket equipped leads	6896 057-1	3 g
RTXK AC short-circuit connector	5371 050-A	12,0 g
RTXI DC shunt connector	5371 050-B	4,5 g







*) Also available in larger packages, see Buyer's Guide

Type RTXG 10 A pin/socket connector

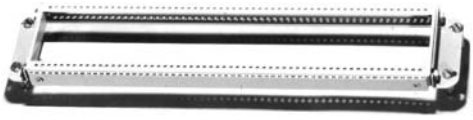
The RTXG is used for rapid connection and disconnection of leads and multi-core cables, for example between relay cubicles or apparatus groups.

The socket connector has build-in locking clips for retaining the socket leads. The pin connector has build-in double-sides pins; one pin side contains locking clips for retaining the socket leads and the other pin side without locking clips is plugged into the socket connector.
The connector consists of a single unit or is assembled in blocks of two, four or six units.
The pin connector, is preferably fixed mounted to a 2U 60C apparatus frame, which is usually located in the rear mounting plane of the relay cubicle. See figure 10.
The socket connector (moving portion) is plugged into the pin connector and secured with a rotary locking screw or a metal tensioning bolt, if the connectors are assembled in blocks. See figure 11.

Fig. 10

2U 60C apparatus frame *)

Ordering No: 5284 1350-D



With place for 1 to 30 RTXG connectors. The frame is supplied with a marking strip and can be pivoted, giving access to the pin connectors wiring side. Fixing screws recommended are ST 3,5 x 16.
***) Height requirement is 3U in the cubicle**

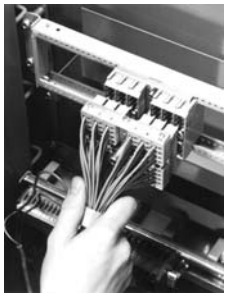
Fig. 11

Socket connector
RTXG 8 - 0
RTXG 16 - 0

Pin Connector
RTXG 8 - 1
RTXG 16 - 1

Socket connector
RTXG 8 - 0
RTXG 16 - 0

Pin connector
RTXG 8 - 1
RTXG 16 - 1

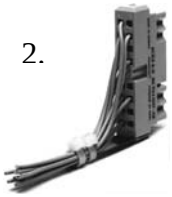
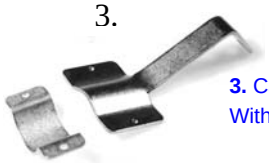


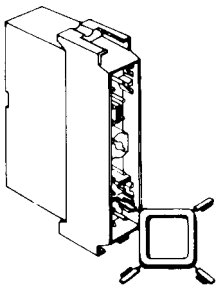
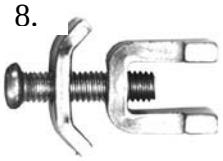
Ordering numbers: Socket connectors

	No. of Connectors	No. of terminals Single (Blue)	Double (Gray)	Size	Ordering No.	Weight g
Socket connectors						
RTXG 8-0	1	-	8	2C	RK 924 007-AB	24
RTXG 16-1	1	16	-	2C	RK 924 008-AB	24
RTXG 802	2	-	16	6C	RK 924 021-BA	150
RTXG 1602	2	32	-	6C	RK 924 022-BA	150
RTXG 804	4	-	32	10C	RK 924 021-BB	210
RTXG 1604	4	64	-	10C	RK 924 022-BB	210
RTXG 806	6	-	48	14C	RK 924 021-BC	260
RTXG 1606	6	96	-	14C	RK 924 022-BC	260

Ordering numbers: Pin connectors

	No. of Connectors	No. of terminals Single (Blue)	Double (Gray)	Size	Ordering No.	Weight g
Pin connectors						
RTXG 8-1	1	-	8	2C	RK 924 007-AA	42
RTXG 16-1	1	16	-	2C	RK 924 008-AA	42
RTXG 812	2	-	16	6C	RK 924 021-AA	160
RTXG 1612	2	32	-	6C	RK 924 022-AA	160
RTXG 814	4	-	32	10C	RK 924 021-AB	250
RTXG 1614	4	64	-	10C	RK 924 022-AB	250
RTXG 816	6	-	48	14C	RK 924 021-AC	340
RTXG 1616	6	96	-	14C	RK 924 022-AC	340

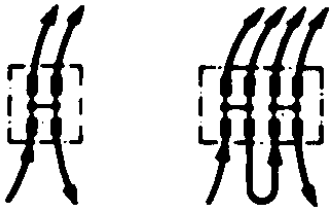
	Accessories to RTXG (Fixing screws are enclosed)	Suitable for RTXG	Ordering No.	Weight g
1. 	**1**. Cable holder for socket connector With two straight and one curved clamp. The holder is to be fixed both at the top and the bottom of the socket connector. Using the straight clamp, wire bundles having a X-section of 23 x 1 to 23 x 7 mm can be attached. Using the curved clap wire diameters between 5 – 10 mm can be attached.	8 – 0, 16 – 0	RK 924 025-AA	32
2. 	**2.** Cable holder without clamp. The holder is to be fixed at the bottom of the socket connector. A bundle of wires with diameters 3- 12 mm can be fixed with cable strap, article No 2166 2055-3.	8 – 0, 16 – 0	RK 924 025-AC	25
3. 	**3.** Cable holder for socket connector With clamp for cable diameter 10 – 20 mm.	802, 1602	RK 924 025-BA	43
	Without clamp	804, 1604	RK 924 025-CA	37
	4. Clamp for cable holder RK 924 025-BA For cable diameter 10 – 20 mm		RK 924 025-EA	6
	For cable diameter 20 – 32 mm		RK 924 025-DA	15

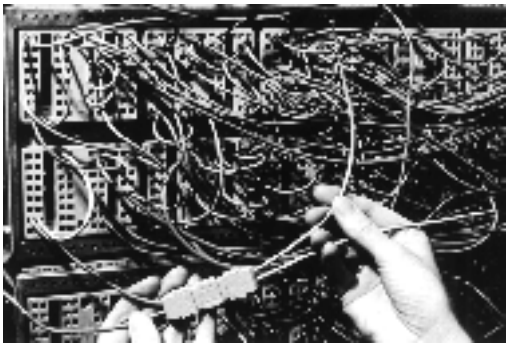
Accessories to RTXG (Fixing screws are enclosed)	Suitable for RTXG	Ordering No.	Weight g.
5.  **5. Keying pins for pin connector.** Prevents the socket connector from being inserted in incorrect pin connector. Set of ten rings, each with four key pins and instruction for six reliable key combinations.	8 – 1, 16 – 1	RK 924 028-AA	25
6.  **6. Mounting bars for socket connectors.** For assembly of three socket connectors. If only two connectors are assembled, the surplus part is to be removed. (Set of two bars in the delivery.)	8 – 0, 16 – 0	RK 924 026-AA	7
7.  **7. Attachment bars for pin connectors** For attachment of five pin connectors in 2U apparatus frame. (Set of two bars in the delivery.)	8 – 1, 16 – 1	RK 924 030-AA	14
8.  **8. Attachment for pin connectors** For attachment of two pin connectors, one above the other, in a 4U apparatus frame.	8 – 1, 16 – 1	RK 924 029-AA	5

Type RTXC, RTXCB branch and cross connectors

Branch connectors multiply the number of connections that can be made to the same electrical point on the relay base

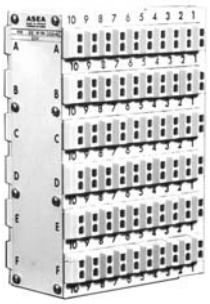
Principle illustration



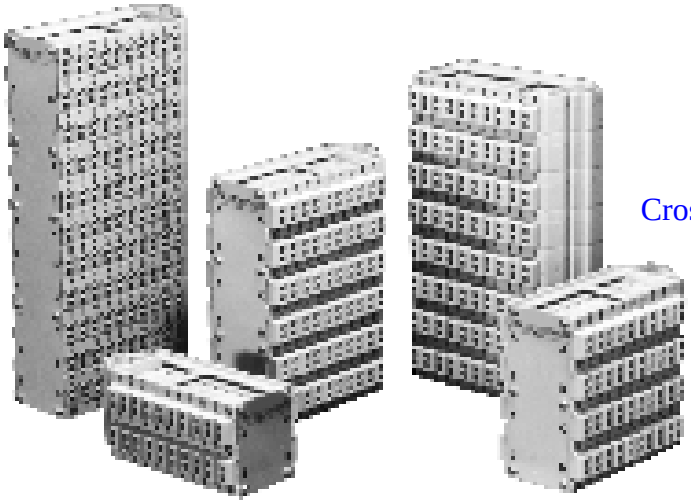


RTXC 1

RTXC 1.3



RTXC 60



Cross connectors of RTXC

RTXC cont.

RTXC connector

The branch connector RTXC 1 has locking clips and two double contact pins build in a plastic housing. This housing is available in clear, transparent plastic for 20 A socket leads and in grey plastic for 10 A socket leads.
The pins use a bus (H) to provide one electrical point. One branch connector can accommodate 1 incoming and 3 outgoing socket leads. (See illustration on previous page) Two branch connectors can accommodate 1 incoming and 5 outgoing, etc.

Separate branch connectors can be hanging between two or more leads. Blocks of 2 to 5 branch connectors clamped together are supplied with holders and tapping screws, ST 3,5 x 9,5 are recommended for mounting to apparatus bars or racks.
Note, that the distance between such blocks must be sufficient to permit the use of extractor RTXD when removing socket leads from the terminals.

RTXCB connector

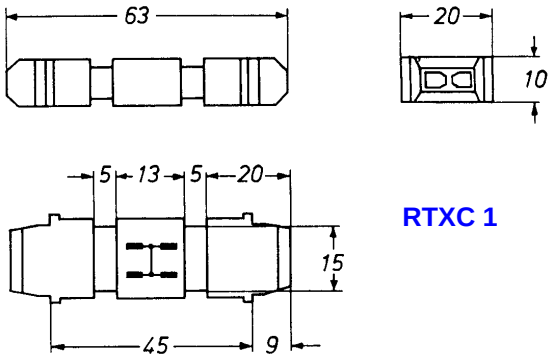
The branch connector RTXBC has locking clips in one side and cable with contact pins build in a plastic housing. The free end of the outgoing cable has a contact socket of 10 A type. (See last page.)
The RTXCB branch connector can accommodate 2 incoming socket leads of 10 A and 1 outgoing thought the existing cable with 10 A socket.
Note, that the existing cable can't be removed with RTXD extractor.

RTXQ connector

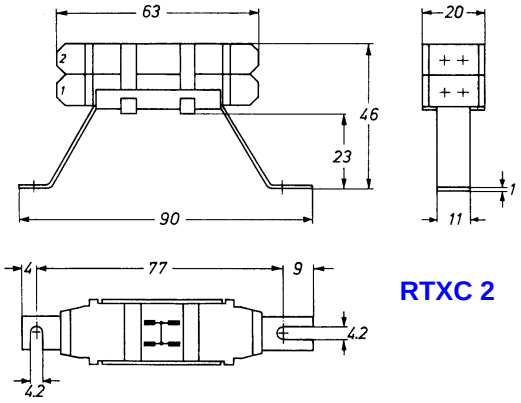
The branch connector type RTXQ has 3 locking clips and contact pins build in at the one end of the plastic housing and one contact socket of 10 A type going out from the other side.
The connector can accommodate 3 incoming socket leads and 1 outgoing thought the existing contact socket.
Note, that RTXQ connector can't be removed with the RTXD extractor, when already mounted in its position.

Cont: Dimensions RTXC:

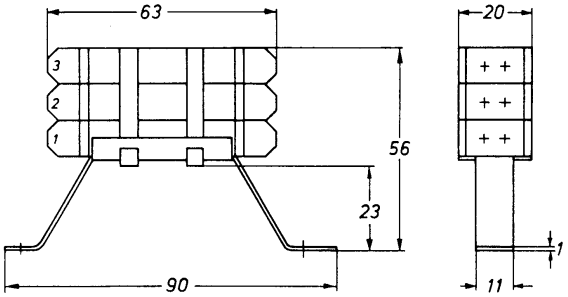
Dimensions RTXC 1, RTXC 2, RTXC 3 and RTXC 5 Branch connectors

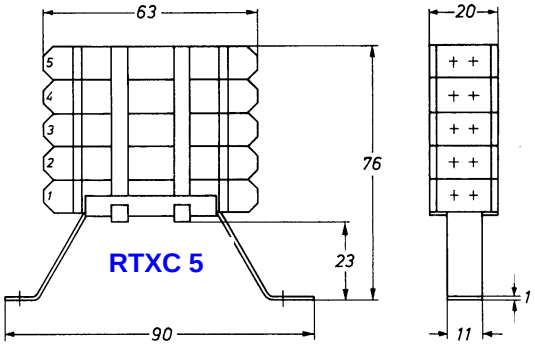


RTXC 1



RTXC 2



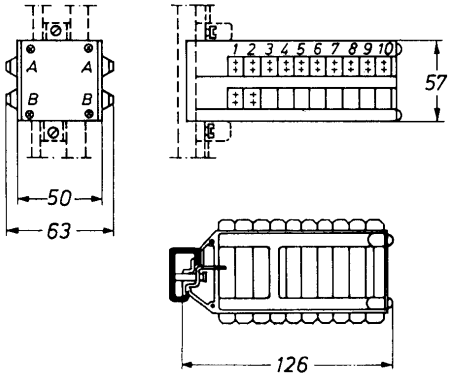


RTXC 5

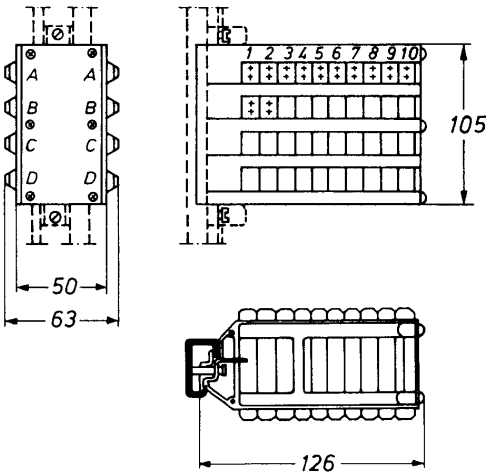
Marking strips:
For ordering see table on page 15

Cross connectors

RTXC 20



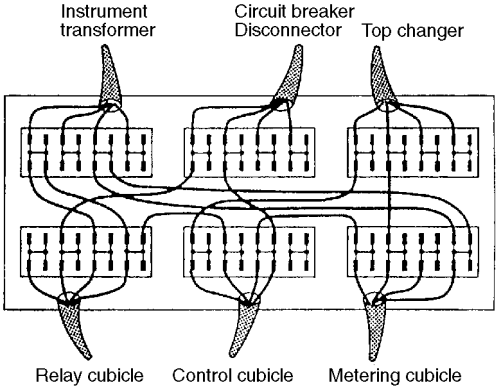
RTXC 40



Cross connectors

Cross connectors consist of 20, 40, 60, 80 or 100 RTXC 1 branch connector units mounted on a front plate. RTXC 20 has 2 x 10 branch connector units; RTXC 40 has 4 x 10 branch connector units, etc, etc.

Cross connectors with up to 100 separate branch connector units are terminal blocks for making external connections or for connections between cubicles.



Principle diagram showing the use of RTXC cross connectors.

Ordering No.

Type	Max. No of leads	10A Gray	20 A Transparent	Weight gram	Mounting bar Suitable length, mm
RTXC 1	1 x 4	RK 924 004-AA	RK 924 004-BA	10	-
RTXC 1.2	2 x 4	RK 924 002-BA	RK 924 002-BA	40	-
RTXC 1.3	3 x 4	RK 924 002-BB	RK 924 002-BB	50	-
RTXC 1.5	5 x 4	RK 924 002-AC	RK 924 002-BC	75	-
RTXC 20	20 x 4	RK 924 006-AE	RK 924 006-BE	310	150
RTXC 40	40 x 4	RK 924 006-AD	RK 924 006-BD	625	210
RTXC 60	60 x 4	RK 924 006-AC	RK 924 006-BC	935	265
RTXC 80	80 x 4	RK 924 006-AB	RK 924 006-BB	1225	295
RTXC 100	100 x 4	RK 924 006-AA	RK 924 006-BA	1530	350
RTXQ	1 x 3	RK 929 006-AA	-	10	-

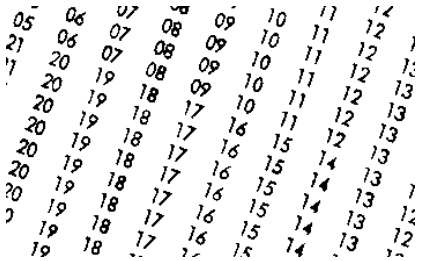
Type	Max. No of leads	10 A Beige	Weight g
RTXCB	1 x 2	RK 924 050-AA	10

Accessories to RTXC 20, 40, 60, 80 and 100

Desciption	Suitable for RTXC	Length of bar mm	Ordering No.	Weight g
Mounting bar	20	150	2175 0011-5	120
	40	210	2175 0011-7	170
	60	265	2175 0011-10	210
	80	295	2175 0011-11	240
	100	350	2175 0011-14	280

Marking strips and labels (self-adhesive)

Marking strips and labels used for identification are to be affixed to bar, connector RTXG, branch connector RTXC, apparatus frame, plug-in apparatus and test switch as below;



X1 X1 X1 X1 X1 X1
X1 X1 X1 X1 X1 X1
X1 X1 X1 X1 X1 X1
X1 X1 X1 X1 X1 X1
X1 X1 X1 X1 X1 X1

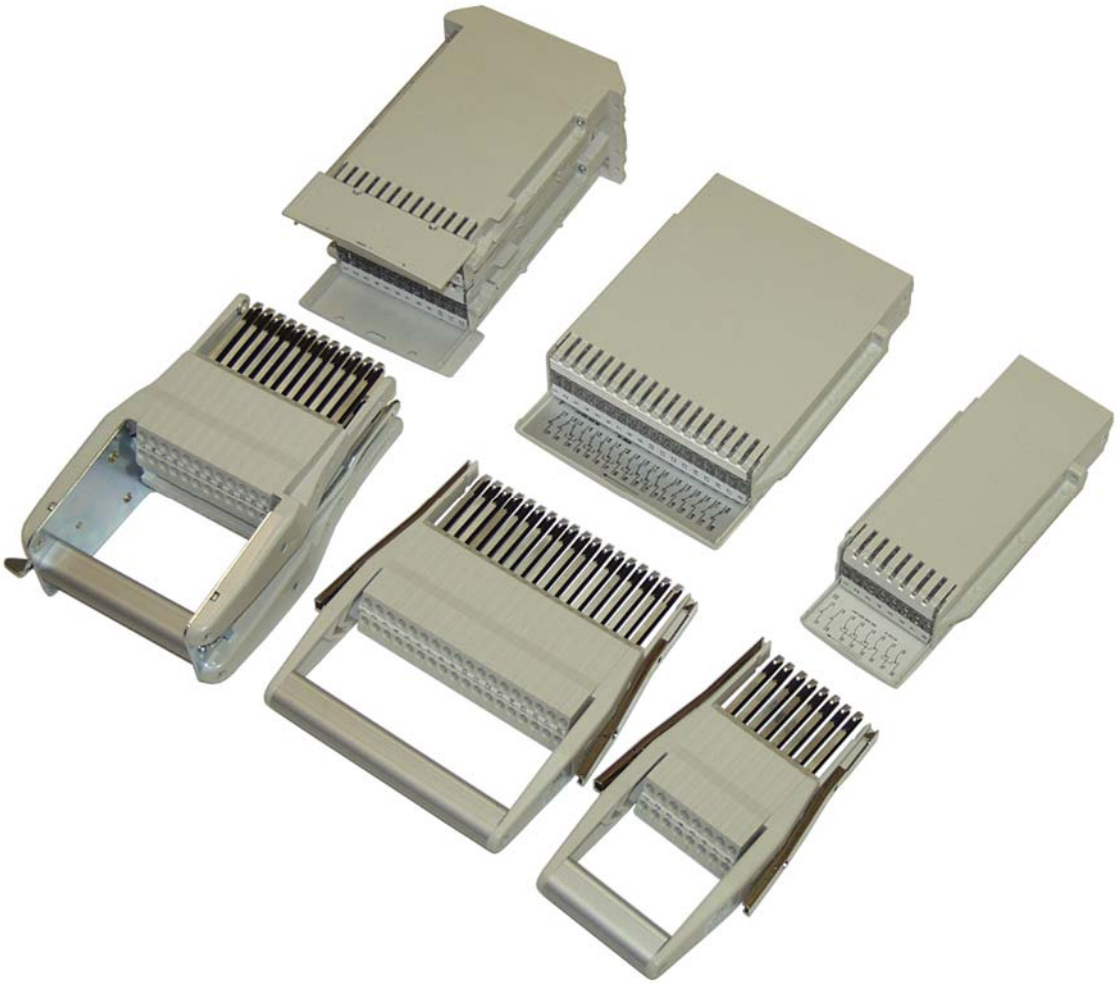
Ordering of marking strips and labels

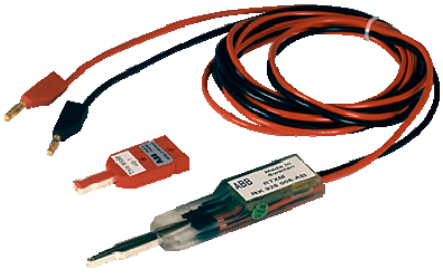
Description	To be affixed to	Marking	No. of identical markings	Ordering No.
Sheet with 2 x 10 marking strips with C-module division, white with black text	Marking bar in equipment frame or case	02-12, 12-02, 02-24, 24-02, 25-48, 48-25, 49-60, 60-49	10 10 10 10	2949 0809-A 2949 0809-B 2949 0809-C 2949 0809-D
Sheet with 1 x 10 marking strips with C-module division, white with black text	Apparatus bars	01-18 19-36 37-60	10 10 10	2949 0808-1 2949 0808-2 2949 0808-3
Sheet with 45 labels 12 x 6 mm yellow with black text	All RTXG and RTXC1-RTXC1-5 and apparatus frames	X1	45	2949 0645-1

Chapter 7 COMBITEST Test system

About this chapter
This chapter contains information about COMBITEST test system and how to use the test handles.

COMBITEST Test system





Test plug handles

RTXH 24

RTXH 18

RTXH 8

Test Switches

RTXP 24

RTXP 18

RTXP 8

Built-in overvoltage protection

RTXM Ammeter test plug

RTXB
Trip-block plug

COMBITEST Ensures...

- Fail-safe sequence controlled secondary injection test
- No accidental trip of the circuit breaker
- Complete isolation of the secondary circuits of the measuring transformers

- Designed to simplify routine tests and commissioning work
- Consists of the following:
  - Test switch **RTXP 8, 18 or 24**
  - Test-plug handle **RTXH 8, 18 or 24**
  - Trip-block plug **RTXB**
  - Ammeter plug **RTXM**
  - Blocking device **RTXF**

General

The COMBITEST Test system, which consists of a Test switch (RTXP 8, 18 or 24) and a portable Test plug handle (RTXH 8,18 or 24) is primarily intended for COMBIFLEX adapted protective relays (Relay assemblies) but can also be used for testing of other types of relay systems e.g. ABB terminals in 600, 500 and 316 series, as well as other makes.

The Test system, in conjunction with a testing set, facilitates simple and rapid measuring of the operating values, the pick-up and drop-out values, etc. of relays without any alterations of the connections. Furthermore, the trip circuits can be blocked separately.

When the connections for testing have been made, a number of relays of same type can be tested one after another. The Test plug handle need only be moved from the Test switch of one protective relay to the Test switch of the other relay without changing the connections. If different types of relays are to be tested, it's a simple matter to change the connections on the Test plug handle and the testing equipment.

The Test switch, which is usually located on the left side of the protective relay has 8, 18 or 24 contact units. The test switch contains contacts of two types, one for current and voltage circuits and one type for trip circuits. Contacts 1 and 18 on RTXP 18 and contacts 1 and 12 on RTXP 24 are always reserved for positive and negative DC supply. Additionally the RTXP 24 has a signaling contact to be used to indicate that the RTXH 24 is inserted. A large number of standard contact combinations exist. The contact units for current circuits have contact bars for short-circuiting of the secondary side of current transformers.

Leads from the measuring transformers, trip circuits and relays are connected to the rear side of the Test switch. A rating plate, fitted to the door, indicates the type designation of the Test switch and to which relay the switch belongs.
A symbol, placed on the inside of the door, shows the contact arrangements of the switch.

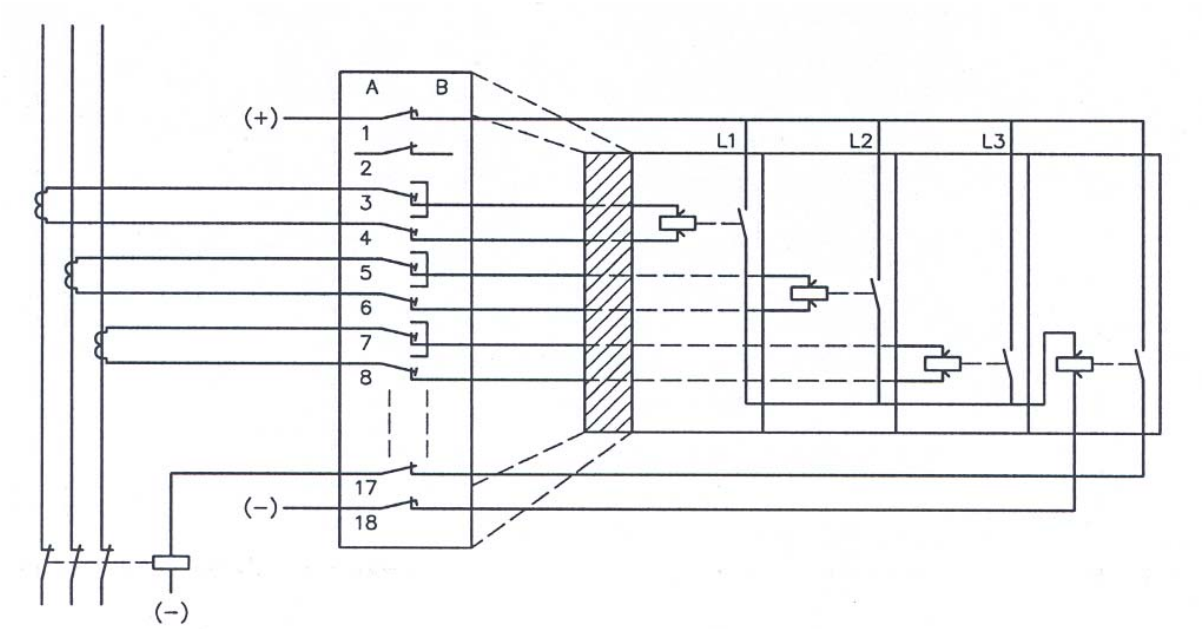
The Test plug handle is equipped with plugs that are connected with leads to the relay testing set. When testing, the Test plug handle is inserted into the Test switch and it is secured in that position with two leaf springs. Always withdraw in sequence according to the design of respective test switch!!

The plugs of the Test plug handle have guide ridges that prevent the handle from being inserted incorrectly. When the Test plug handle is inserted, the trip circuits are first opened and after that the secondary circuits of the current transformers are short-circuited by the contact bar and the voltage circuits are then opened. The relay testing set is then connected to the relays that are to be tested.

In addition to the plugs in the Test plug handle the test system also has separate trip-block plugs for the trip circuits, a block plug handle for complete disconnection of the relay and ammeter Test plugs with over voltage protection for measuring the service current.

Connect testing leads to the test handle RTXH in a zig-zag pattern to get more space between them. This is especially important when using testing leads equipped with a sliding protective cover. Test leads with a fixed protective cover cannot be used.
For more information about COMBITEST see our product catalogue, 1MRK 512 001-BEN.

Service Position



Testing Position

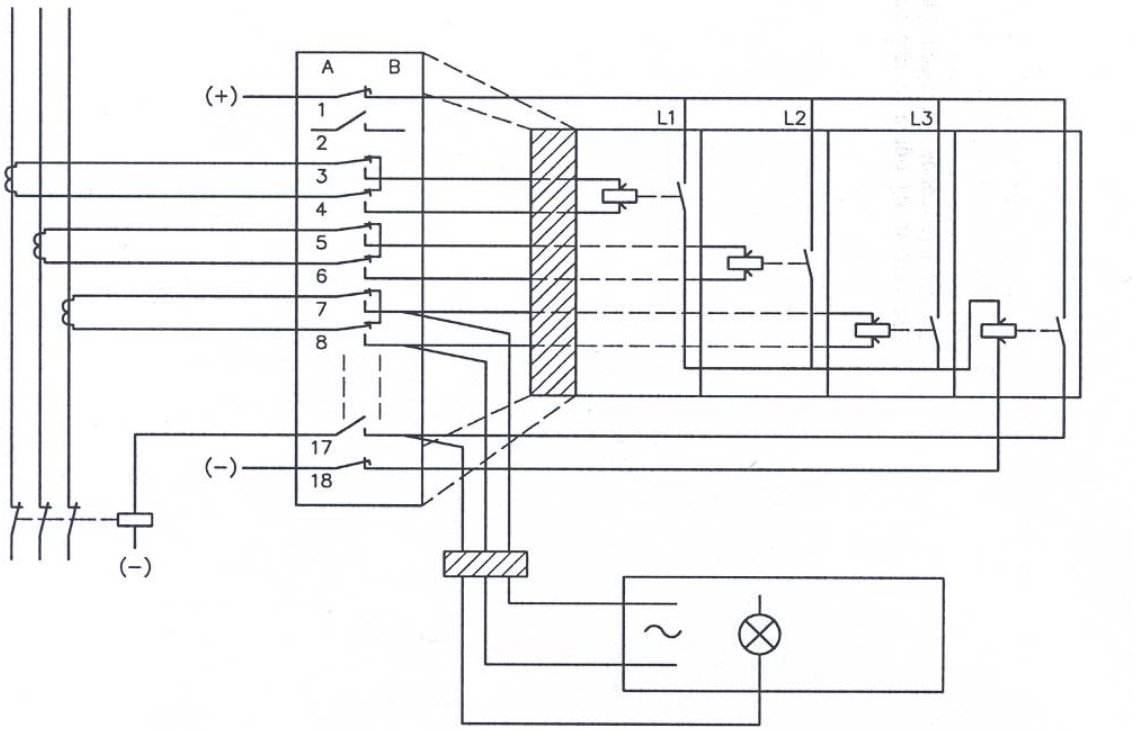


Figure 1-5 show examples of connections, which are used when testing. In figure 1 and 2 a contact bar is used for interconnecting the contact units.

Service position

Testing position

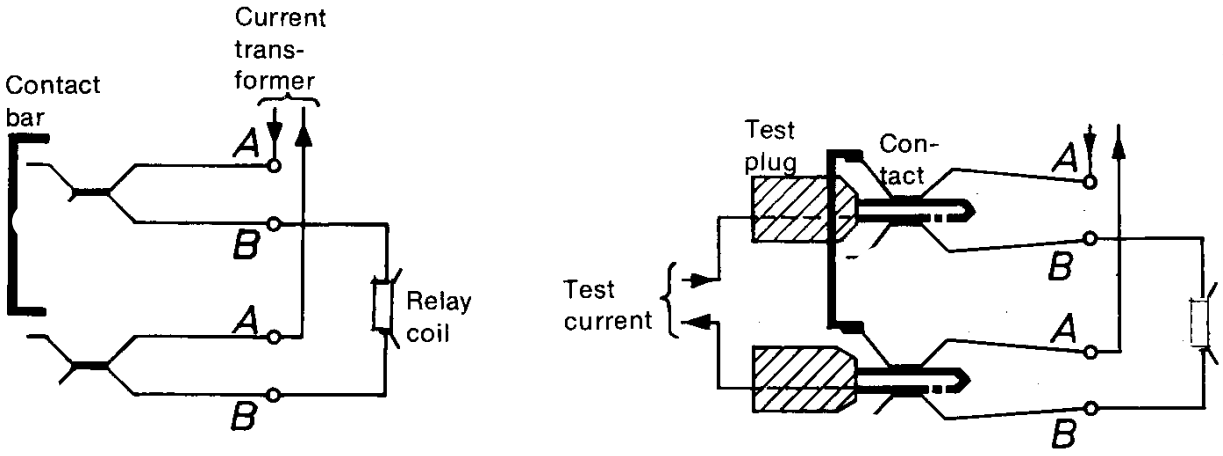


Fig. 1. Connection for testing of a current relay when using the Test plug handle.

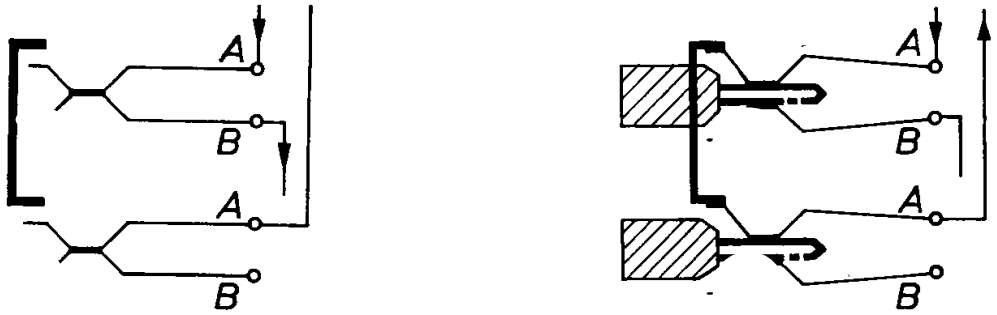


Fig. 2. Connection for obtaining change-over contact

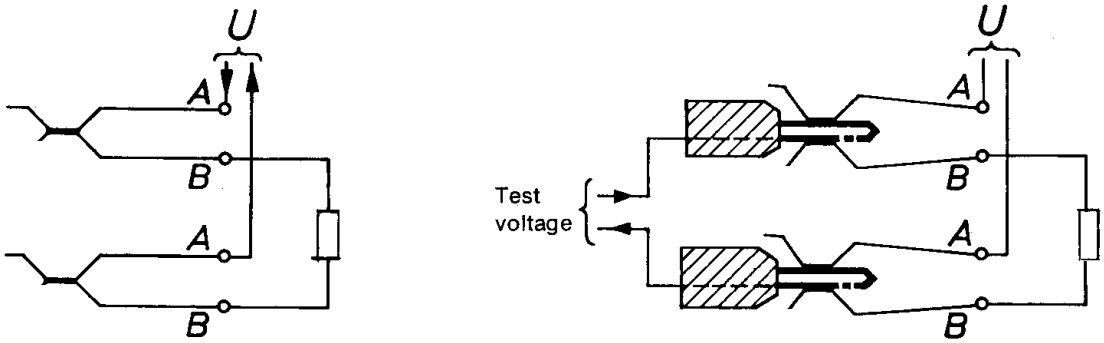


Fig. 3. Connection for testing of voltage relay when using the Test plug handle

Cont.

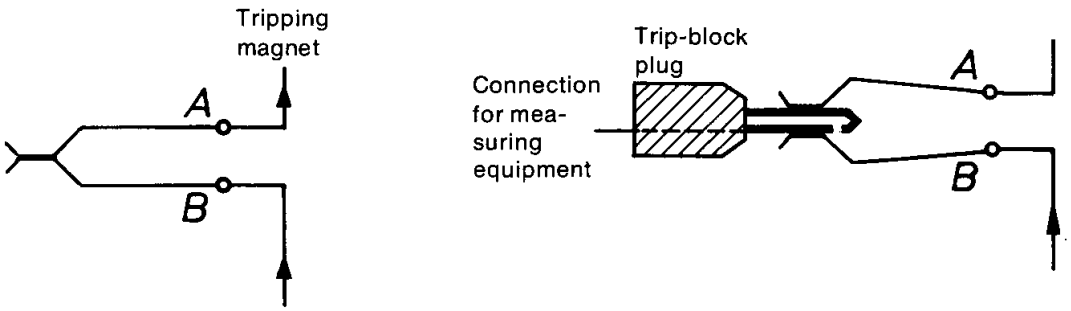


Fig. 4. Connection for blocking of a trip circuit with separate trip-block plug type RTXB, of a circuit or, e.g. for time measuring of tripping pulses.

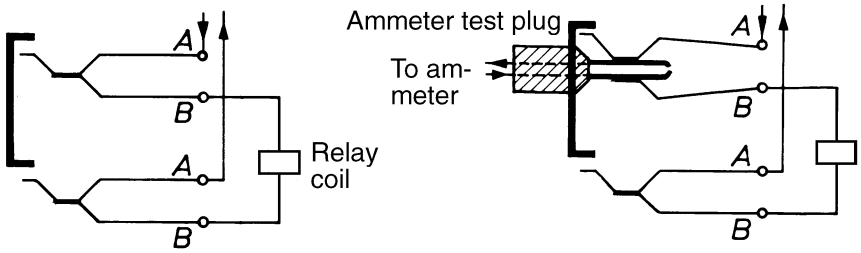
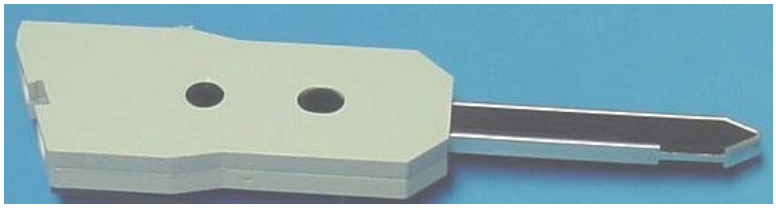
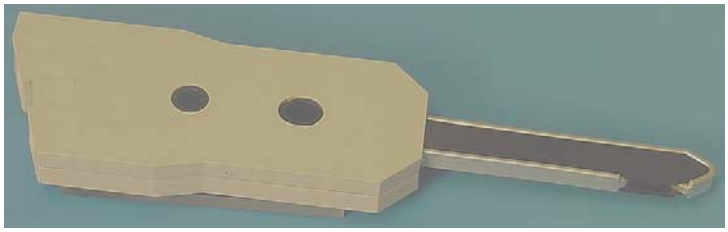


Fig. 5. Connection for measuring of service current with ammeter test plug type RTXM.

Test plugs in the Test plug handle



Terminal plug for aux. voltage + and – are located at the top and bottom, contacts 1 and 18 in RTXH 18 and contacts 1 and 12 on the RTXH 24. Used for supply of dc voltage to the Test equipment. The contact doesn't open any contacts in the test switch.



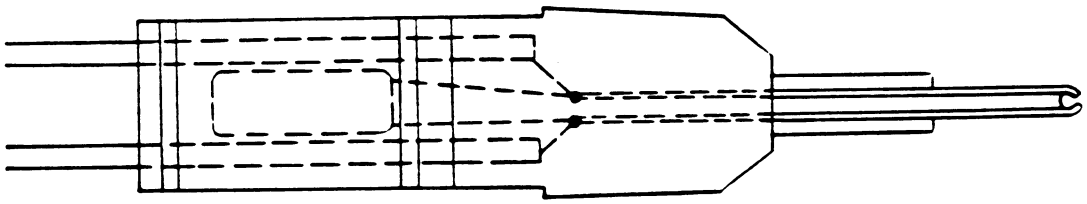
This test plug is located in the Test plug handle and opens both trip circuits, current and voltage circuits in the test switch.

Trip-blocking plug

Trip-block plug, type RTXB is only used separately for blocking of trip circuits. It can also be used for making measurements in the trip circuits. **The plug is red as a reminder that a trip blocking has been carried out.**
The door of the equipment frame can be closed even if the plugs are left in the switch.

Ammeter test plug RTXM

Load current measurement



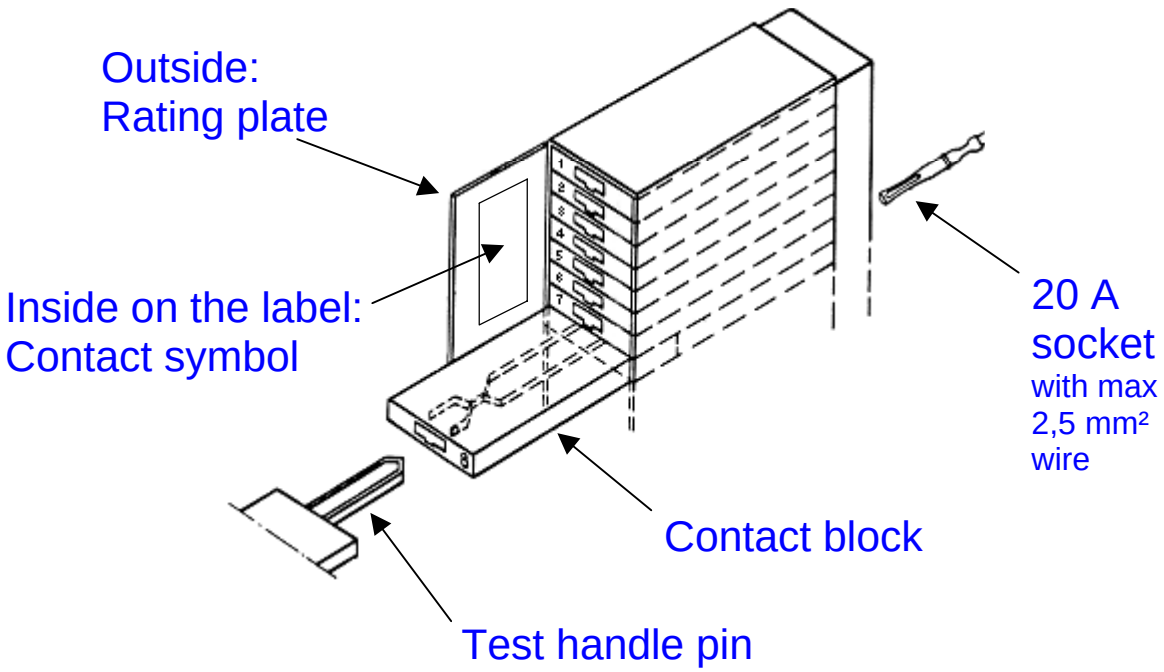
Ammeter Test plug, type RTXM, is used separately for measuring service currents. The test plug has a build-in gas tube as over-voltage protection.

At approx. 300 V, an arc short-circuits the current circuit is opened unintentionally or if the plug is inserted in the Test switch when the ammeter is not connected.

A bimetal contact is heated by the arc and takes over the short-circuiting function. The over-voltage protection can withstand a continuous current of 15A.

The plug has one black and one red lead of 2,5 meters in length and 2,5 mm^2 cross-sectional area.
One end of the leads is embedded in the plug and the other end is equipped with banana type contact.

RTXP Test Switch



Contact block design

Early brake
Contact for tripping circuits

Late break
Contact for current and
voltage circuits

Mounting of RTXP Test switches: Accessories needed

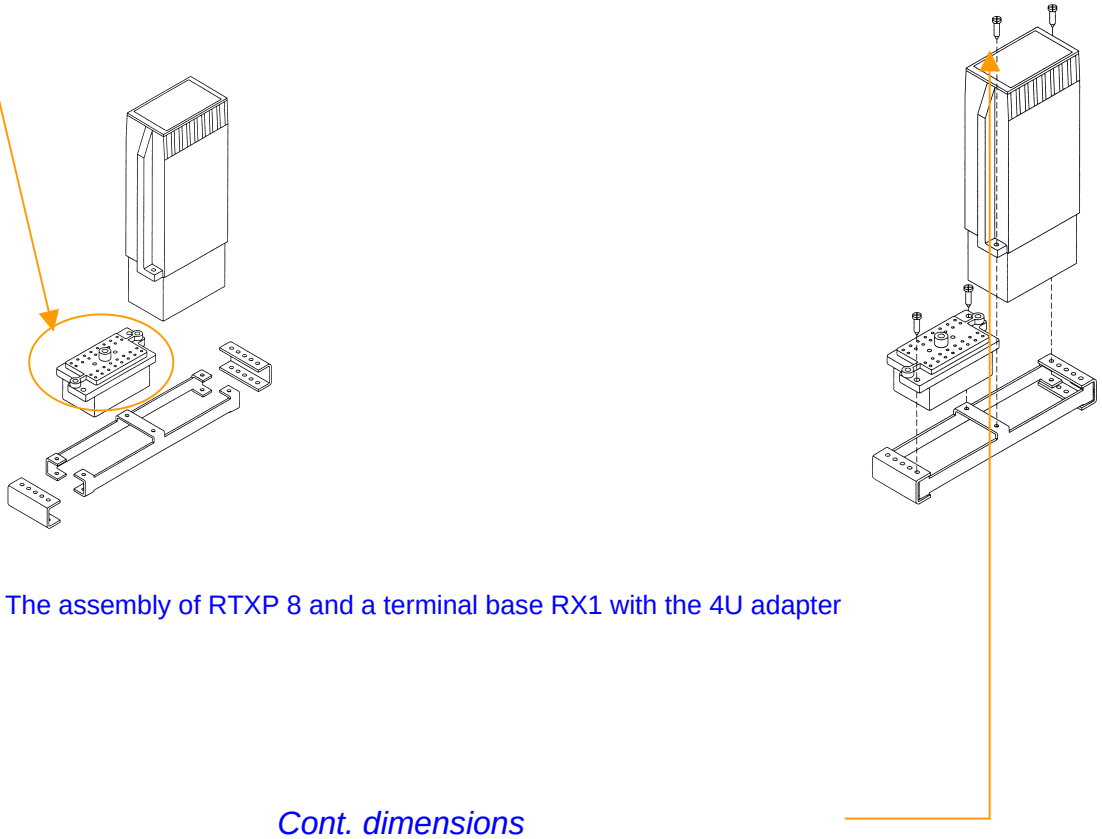
Note: Fixing screws ST 3,5 x 13 (Torx 10 or 15) are enclosed in the delivery of all RTXP's.

RTXP 8, 2U and 6C

Mounting in a RHGS case, (upper part):	An adapter 1MRK 000 316-19 2 pcs. 6C apparatus bars 2175 323-7
Mounting in a 4 U rack with apparatus frame:	An adapter, 1MRK 000 316-19
Mounting in a 4 U rack with support frame:	An adapter, 1MRK 000 316-19 2 pcs. 6C apparatus bars 2175 323-1

Mounting in the rack build with the bars 1MRK 000 316-23: An adapter, 1MRK 000 316-19

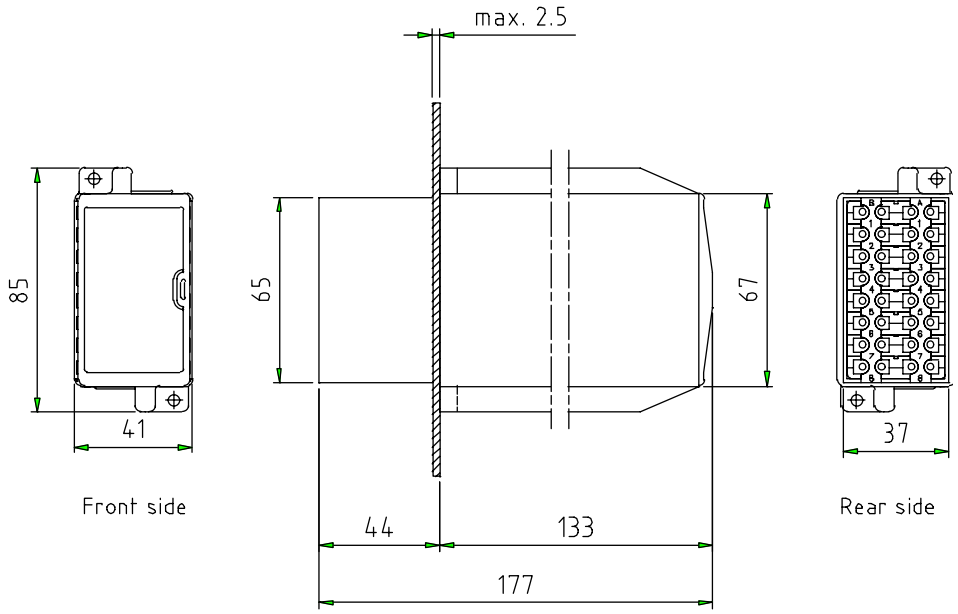
Note: A terminal base type RX1 can be mounted to the lower part of the adapter.

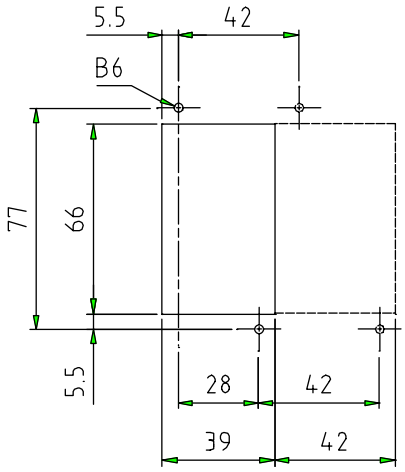


The assembly of RTXP 8 and a terminal base RX1 with the 4U adapter

Cont. dimensions

RTXP 8





Drilling plan front side

RTXP 18, 4U 6C

Mounting in a RHGS case**:** **2 pcs. 6C apparatus bars 2175 323-7**

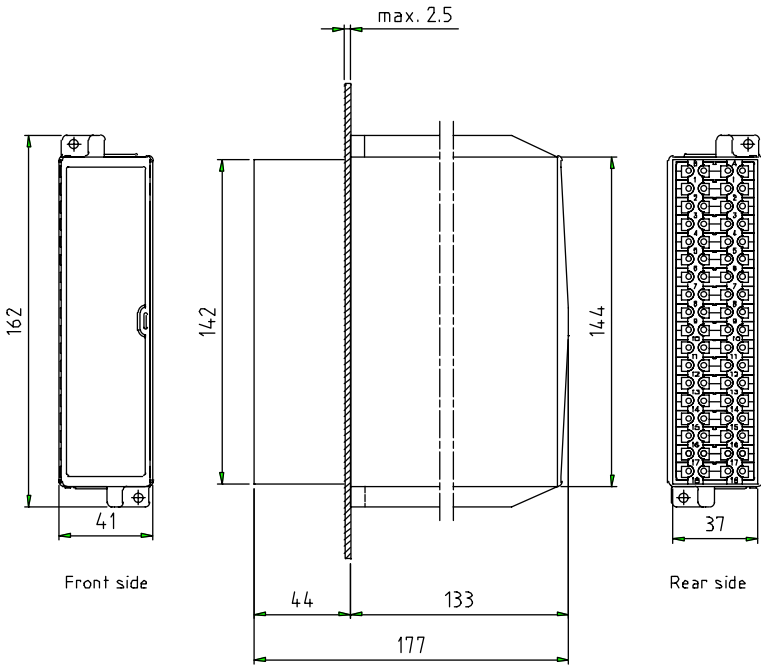
Mounting in a 4 rack with apparatus frame**: No accessories are needed**

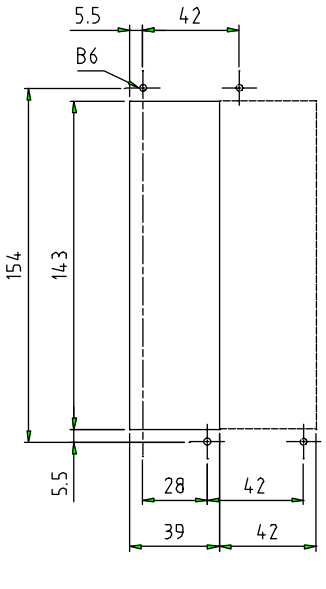
Mounting in a 4 rack with support frame**: 2 pcs. 6C apparatus bars 2175 323-7**

Mounting in the rack build on 1MRK 000 137-PA or -RA**: No accessories are needed**

Cont: Dimensions

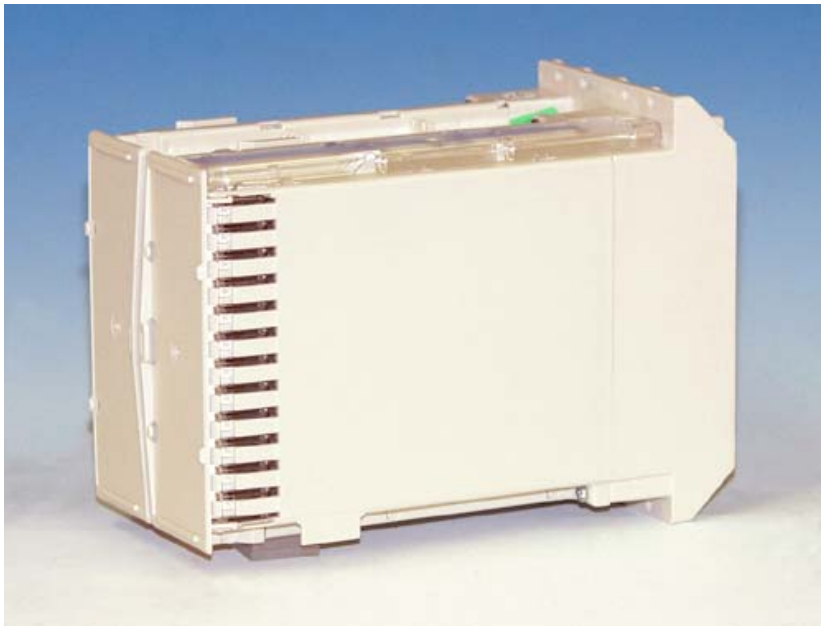
RTXP 18





Drilling plan front side

RTXP 24, 3U 12C



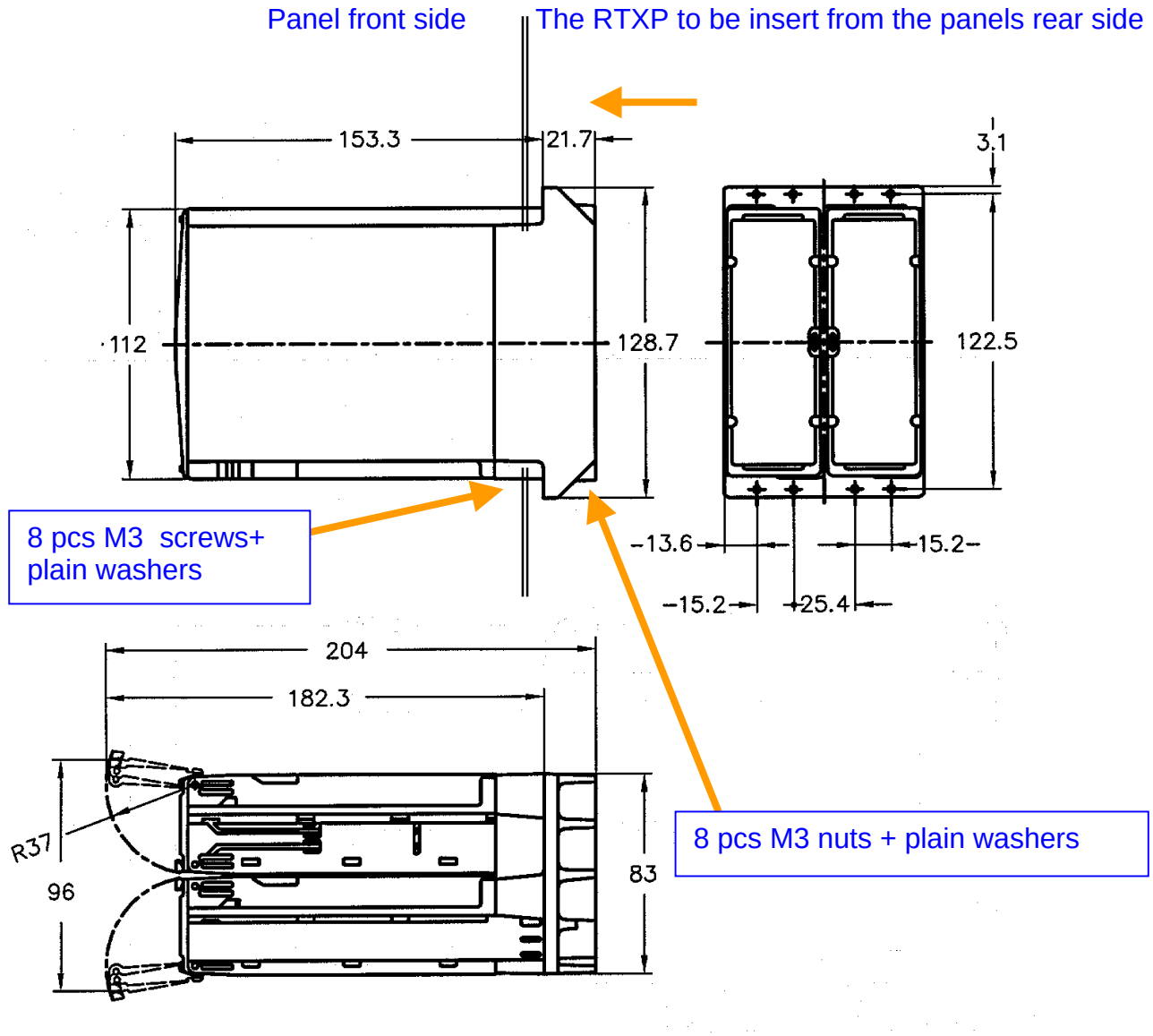
Mounting accessories:

Mounting in a RHGS case (upper part)**:**	**2 pcs apparatus bars 2175 323-1** **1 pc Mounting kit 1MRK 000 020-BT**
Mounting in a 4U rack with support frame**:**	**2 pcs apparatus bars 2175 323-1** **1 pc Mounting kit 1MRK 000 020-BT**
Mounting in a 4U rack with apparatus frame**:**	**1 pc Mounting kit 1MRK 000 020-BT**

Mounting in the rack build on 1MRK 000 137-PA or -RA**: 1 pc Mounting kit 1MRK 000 020-BT**

Please note that RTXP 24 is not designed for panel mounting, but can be mounted according to the pictures below.

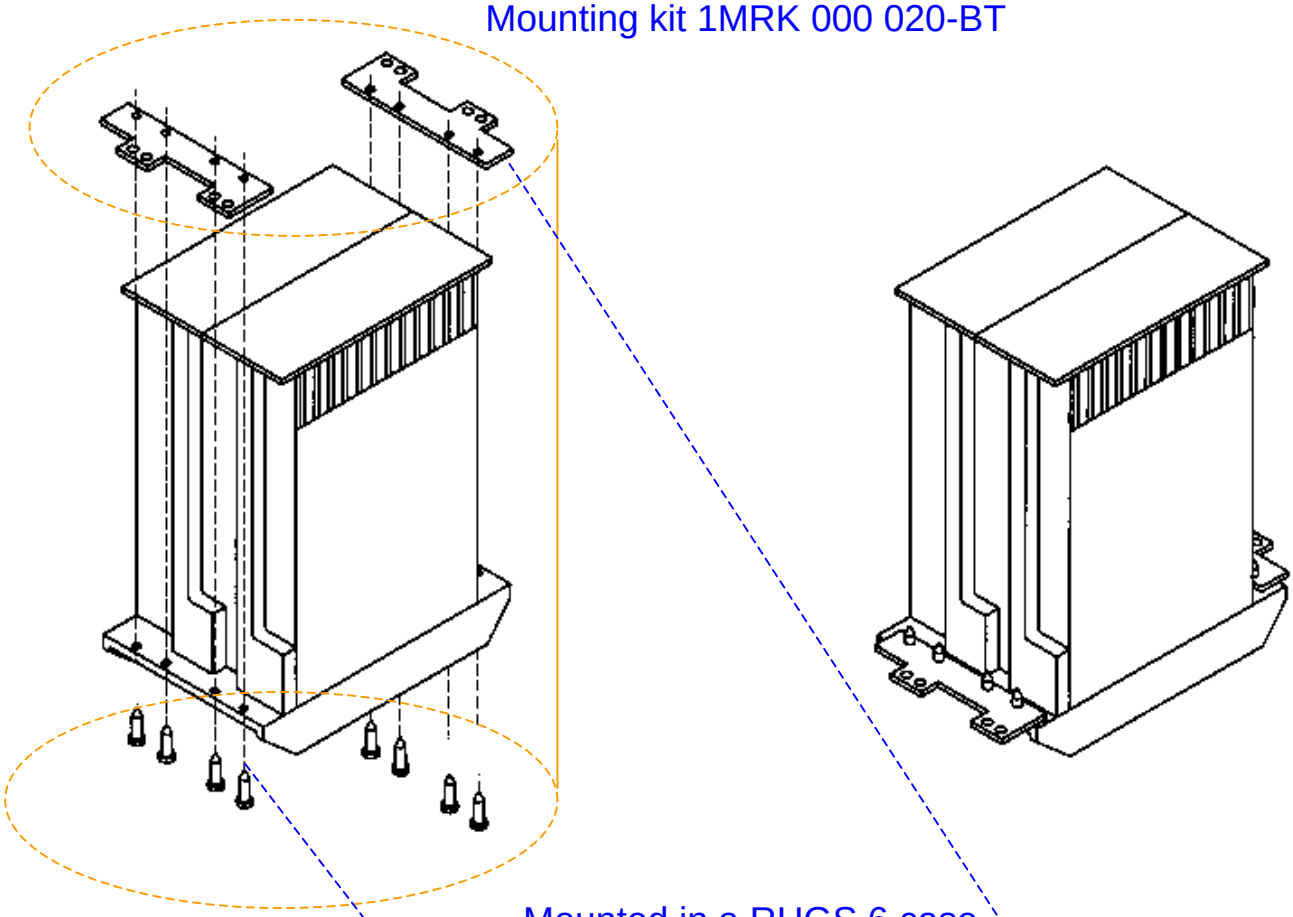
When mounting more than one test switch to same rack or similar a free pace of 1C (7 mm) is required between the test switches.



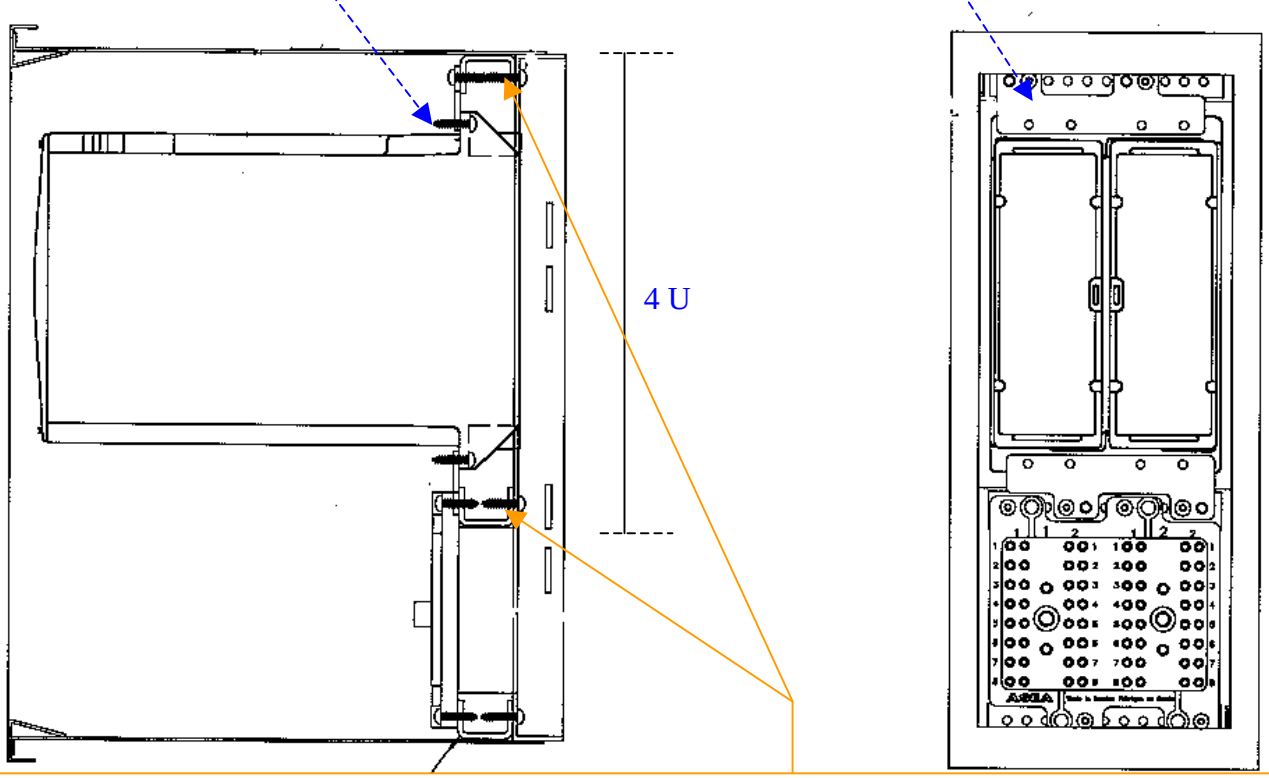
Cont. Mounting to RHGS 6 case and 4U rack

Adapted to 4 U mounting by

Mounting kit 1MRK 000 020-BT



Mounted in a RHGS 6 case



Mounted to support frame with 2 * 2175 323-1 apparatus bars and Kit 1MRK 000 020-BT
Please note that the apparatus bars are not needed when mounting to apparatus frame or to the new combined support/apparatus rack 1MRK 000 137-PA/RA with the 2 bars of 1MRK 000 316-23.

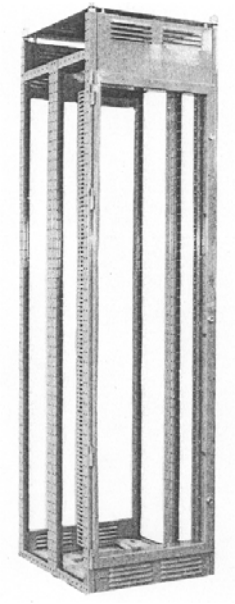
Chapter 8 Examples of cubicle design

About this chapter
This chapter is aimed to give some guidelines and examples of the cubicles, terminal blocks and cables.

Selection of the cubicle

The cubicle design must be carefully chosen according to all electrical and mechanical demands as well as the environmental demands where the cubicle will be located.

- **The cubicle should be designed where applicable to international IEC standard publication 439-1 and other IEC publications referred to this standard.**
- **Degrees of protection as per IEC 529: IP21, IP41, IP43 or IP54**
- **Earthquake protection. (IEEE 693 draft 5)**



Degrees of protection

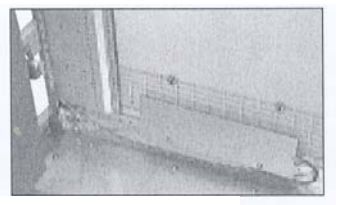
IP21, IP41, IP43, IP54 according to IEC 529

Definition of degrees of protection under IEC 529, IPXY:

X=2 Protected against solid objects greater than 12 mm
X=4 Protected against solid objects greater than 10 mm
X=5 Dust protected
Y=1 Protected against dripping water
Y=3 Protected against spaying water
Y=4 Protected against splashing water

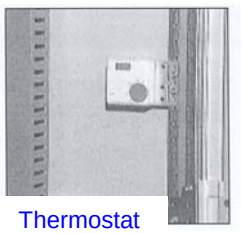
Environmental aspects

The cubicle can be fitted with thermostat, see figure 2, for heating elements, see figure 1, to prevent condensation. The normal cubicle is designed for indoor use in a dry environment at reasonable humid and air polluted environment.



Heating element

Fig. 1



Thermostat

Fig.2

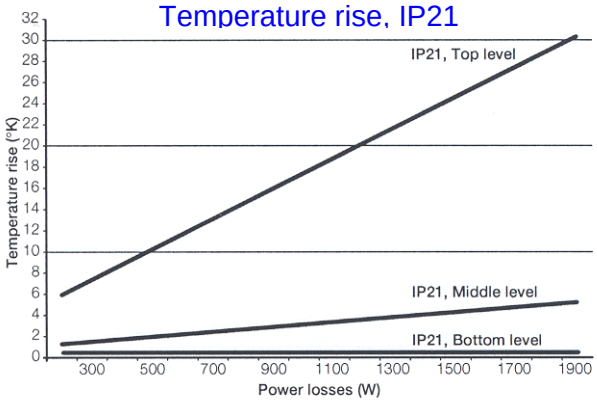
Earthquake protection (according to IEEE 693 draft 5)

At the areas with a risk for earthquake the cubicle should sustain a maximum ground acceleration (ZPA) of 0,5g.

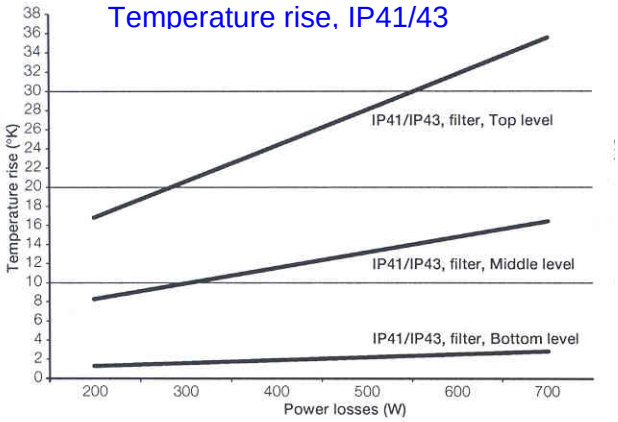
Power losses

The temperature rises in a cubicle due to the power losses from the installed equipment. It also depends on the cubicles degree of protection (airtightness). Self-ventilated cooling is also highly dependent on the type of equipment involved and where it is located in the cubicle.
Allowed temperature rise are given as guidelines below.

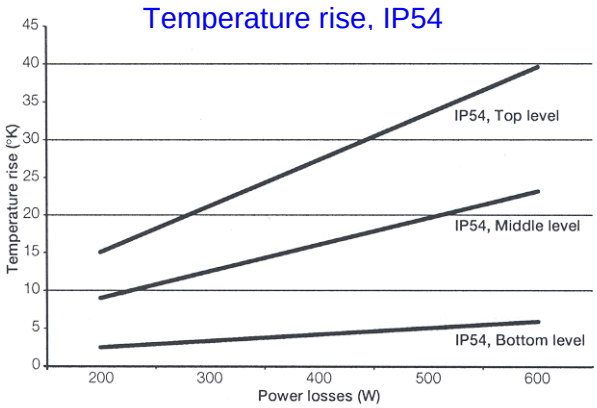
IP21 Ventilated door and rear panel, both at the top and on the bottom.



IP41/43 Ventilated door and rear panel. With dust filter, both at the top and on the bottom.



IP54 A sealed cubicle



Ambient temperature: = IMPORTANT

Maximum permissible ambient temperature for relays

Our relays are designed for a maximum ambient temperature of 55°C at 120% of rated voltage.

Cont. next page

The permissible ambient temperature stated for a relay means the average temperature surrounding the relay itself and not the temperature in the control room where the cubicle or panel with the relays is located.

If a relay is mounted in cubicle, case or other sealed enclosure, consideration must be given to the increase in temperature, which is obtained depending on the power losses of the equipment.

Permissible temperature increases

The maximum permissible ambient temperature for relays mounted in a case or cubicle is less than the specified 55°C but the temperature rise in the case and cubicle.
The temperature rise must be considered of the design of control rooms. The temperature rise for the "room" ambient temperature to the "relay" ambient temperature could be 15°C if the maximum permissible power losses given in Table 2 are applicable
In general the actual power losses will be less than the maximum permissible values and the temperature rise will be less than15°C. The maximum permissible "room" ambient temperatures corresponding to +55°C "relay" ambient temperatures could be +40°C.

If the room temperature is higher it is necessary to keep the increase lower than 15°C. This can be achieved by the mounting equipment in several cubicles or cases in order to reduce the supplied power losses per cubicle or case or by improving the cooling through increased natural ventilation or by forced ventilation using a fan.
The total power losses of the relays incorporated in a case or cubicle are usually too low to cause 15°C temperature increase.
However, there are two situations when it maybe necessary to observe the total power losses and rearrange the relaying equipment and if necessary, reduce the total losses per frame or cubicle.
The first case is when the auxiliary voltage supply is 220 or 250 V dc for several (2-3) voltage or current measuring relays with fairly high power consumption, positioned in the same equipment frame or in equipment frames mounted close to each other. It is not possible to fill all positions in a cubicle or a rack or otherwise pack the above relays too closely and stay within the 15°C rise in the air surrounding the relay.
The other situation concerns auxiliary relays. There is a limitation of the numbers of continuously energized auxiliary relays that may be included in a RHGS or RHGX cases or equipment frame and still stay within the 15°C rise.
For example in an application of continuously energized interposing relays. Note that the emphasis is on "continuously energized" relays.
The temperature rise rather than the physical space may limit the number of relays in a case of frame.

Permissible power losses

Permissible power losses of relays in cases type RHGS or RHGX

Consideration must be given to how the case is mounted when defining the permissible power losses. When a case, for example, is flush-mounted in the front of a cubicle, it is necessary to add the temperature increase of the air in the cubicle to that temperature increase that is calculated to be within the case to obtain the total temperature increase in the case relative to the room temperature.

Permissible power losses of relaying equipment in cubicle

Table 2 states recommended values of permissible power losses of relaying equipment mounted in the D-plan (the hinged frame or front plane) and the B-plane (the rear mounting plane).
Relays **are not recommended** to be mounted in the B-plane as the air circulation is minimal.
It is recommended to mount only transformers, resistors and similar apparatuses in the B-plan.

Temperature rise

Calculation of temperature rise within RHGS or RHGX case mounted in a cubicle

$$\Theta_{relay} = K_H \times P_H + K_S \times P_S$$

Where

Θ_{relay} = the increase of the ambient temperature of the relay

K_H = the RHGP, RHGS or RHGX case thermal resistance

P_H = the total power losses of the relays in the case

K_S = the thermal resistance of the cubicle (for the cubicles acc. to Table 2)

P_S = the total power losses in the cubicle

Table 1: Permissible power losses for 15°C temperature increase in RHGS and RHGX cases

Case type	K_H °C/W	W
RHGS 6	2,5	6
RHGS 12	1,5	10
RHGS 20	0,9	17
RHGX 4	2,5	6
RHGX 8	1,8	8
RHGX 12	1,4	11
RHGX 20	0,9	17
RHGX 40	0,65	23

Cont.

Table 2: Permissible power losses in a cubicle type (ABB VHS200, 700 mm) for maximum 15°C temperature increase in the relay ambient

Cubicle location	Code	Cubicle design	Permissible power losses				Thermal resistance of the cubicle
			Equipment 1) frames above and underneath	Equipment 1) frames with 4U space between each frame	Totally in cubicle		K_S
			W/4U-equipment frame		W/cubicle	Example of cubicle location	°C/W
Freestanding Cubicle	A1	Sealed cubicle	17	28	170	170 W	0,09
	A2	Tropical 3) design					
	A3	Ventilated 5) design	25	40	250	170 W	0,06
Mounted at the side of one cubicle with approx. the same power losses 4)	B1	Sealed cubicle	13	21	130	130 W	0,12
	B2	Tropical 3) design				130 W	
	B3	Ventilated 5)	22	35	220	220 W	0,07
Several cubicles located in a row with max. permissible power losses	C1	Sealed cubicle	11	17	110	130 W	0,14
	C2	Tropical design 3)				110 W 110 W 130 W	
	C3	Ventilated 3)	20	30	200	220 W 200 W 220 W	0,08

1) Refers to several similar equipment frames with regard to power losses and with the power distributed over the whole equipment frame.

2) Also applicable for equipment frames mounted close to each other if every alternate equipment frame has a low continuous power loss (approximately 5 W). It is desirable to mount the equipment frames in the cubicles with the maximum possible space between to ensure the best possible heat dissipation.

3) The heater should be disconnected by a thermostat at maximum 45°C.

4) Is also applicable for locations where the cubicle is located back-to-back or close to a wal (with approximately 50 mm distance between the back of the cubicle and the wal).

5) Self-ventilated design according to figure 3.

Self-ventilated design of the cubicle

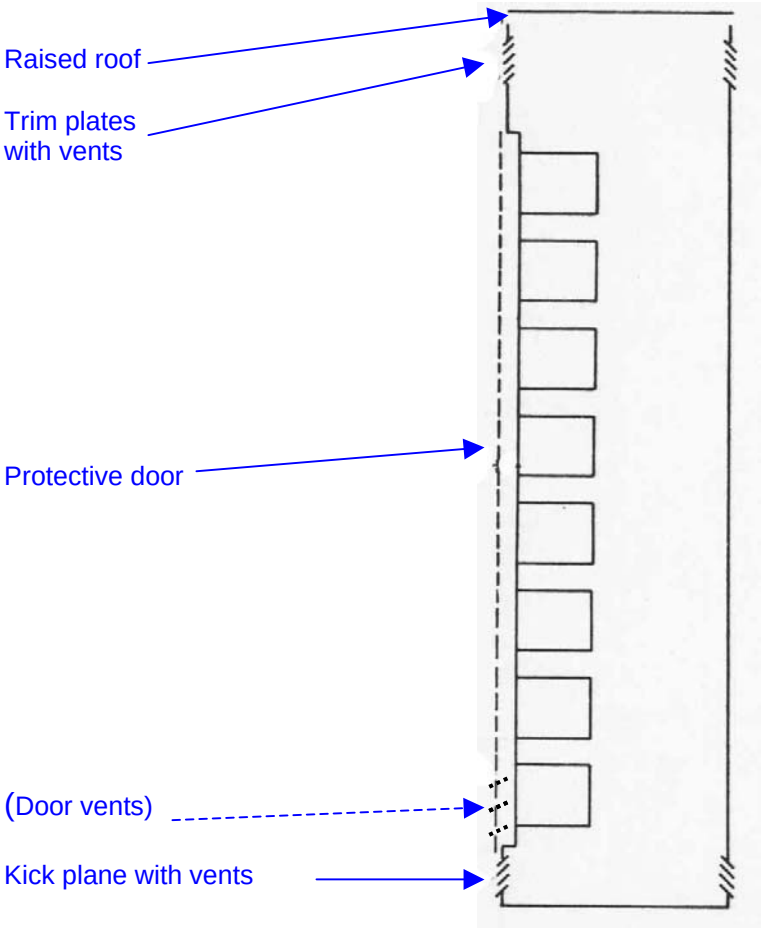


Fig. 3 Self ventilated design of the cubicle

The roof:
The roof plate is raised 20 mm to provide an outlet for heated air.

Trim plane with vents:
Provides an outlet for heated air.

Protective door with vents when required.

Kick plane with vents:
Provides cool air for the rear mounting plane (B).

Cont.

Table 2 is applicable for convection in sealed or self-ventilated cubicles with design according to figure 3. When the power losses are approximately evenly distributed in the equipment frames, the temperature increase will not exceed 15°C.

Sources of maximum heat loss such as power supplies for static relays and continuously energized auxiliary relays should preferably not be located in close to each other but with the maximum possible spacing to ensure the lowest temperature in their surrounding air.

The equipment frames containing relays with the highest power losses should be preferably be positioned as low as possible in the cubicle.

The temperature increase should be calculated when designing the layout of a relaying equipment. This is done by adding the power losses at rated voltage for all the relays in the cubicle that are simultaneously energized including auxiliary relays, and comparing the calculated values with those in table 2. It is normally sufficient to calculate with only the power losses of the auxiliary voltage supply for the static and numerical relays and ignore the losses of signal circuits.

The power losses in table 2 shall be calculated on the basis of the losses at 100% of rated voltage, as obtained from the technical data tables (see date for each relay type on the Buyer's Guide). The temperature rise of 15°C has, however, been based on the relays operating at their maximum permissive voltage. For relays operating at their rated voltage the permitted losses in table 2 will result in a temperature rise less than the specified.

Earth connection

All units in the cubicle shall be earthed trough the cubicle frame framework. All units must be well fixed with their screws tightened up correctly.

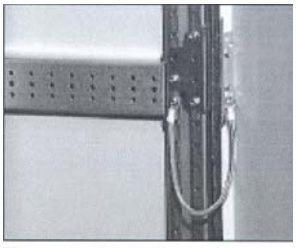
Equipment with connector *) for protected earth shall be connected to earthing bar in the cubicle with a **green/yellow** cable, with minimum area selected according to maximum of power supply conductor or minimum gross section area of 1,5 mm².

*) can be a screw

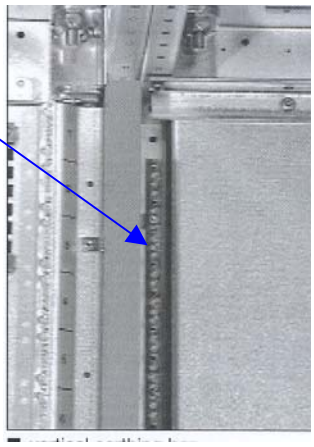
The protective earth connection points in the equipment are marked by this type of label

If a cubicle with hinged frame is used the frame shall be earthed to the cubicle frame with two **green/yellow** wires, each with a minimum area of **6 mm².** One to the top and one to the bottom of the cubicle.

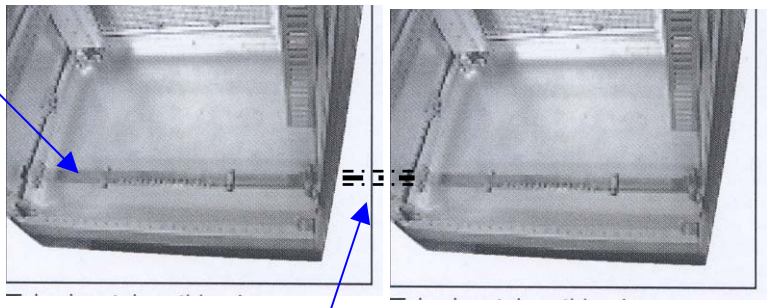
x 2



An earthing bar, with size 12 x 3 mm (vertical mounting)



or 30 x 10 mm (horizontal mounting),
shall be installed in the base of the cubicle.

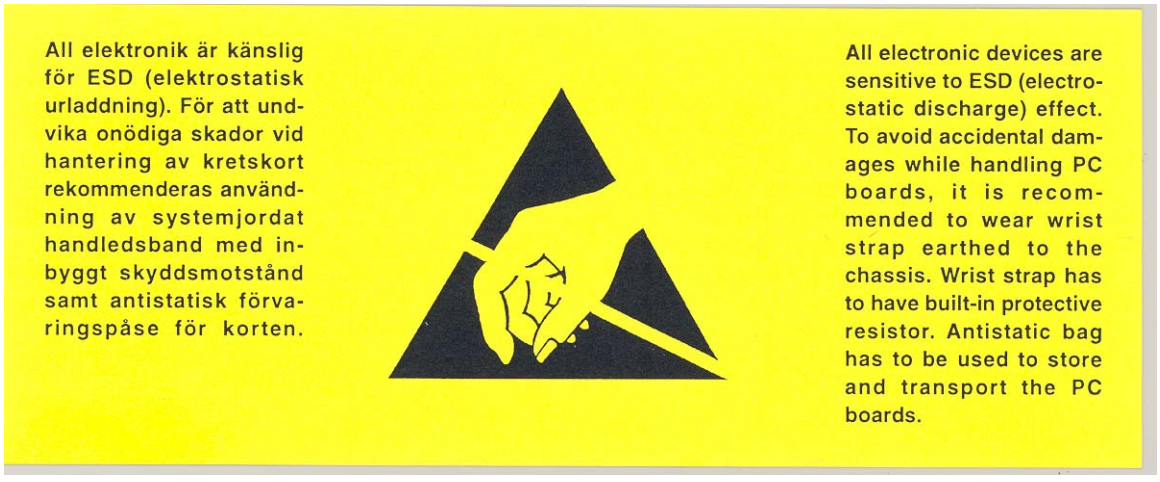


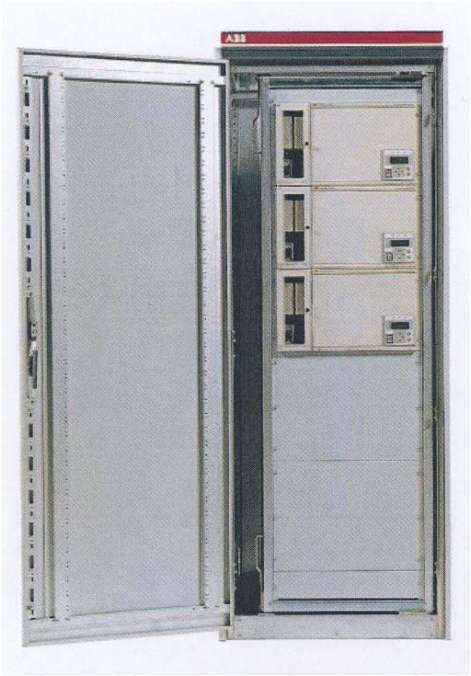
When two or more cubicles are installed side-by side, the earthing bars shall be joined together with jointing pieces.
The earthing bar is then connected to an earth grid or equivalent in the plant.

Electro static discharge (ESD)

A wrist ESD-bracelet connected to protective earth shall always be used to minimize the risk of ESD-damages on the equipment when work shall be done in the cubicle.

Is also required to make the end-user of cubicle el. aware of that the cubicle contains ESD sensitive equipment by a to cubicle attached label to the cubicle before delivery.



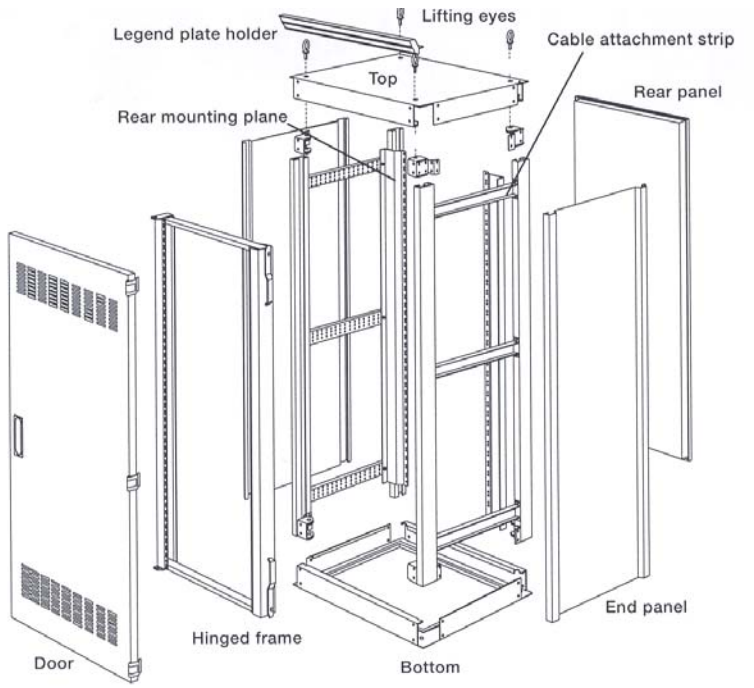


A cubicle, type MNS Select, manufactured by ABB Low voltage systems, application with protective and control equipment for electric power distribution and transmission.

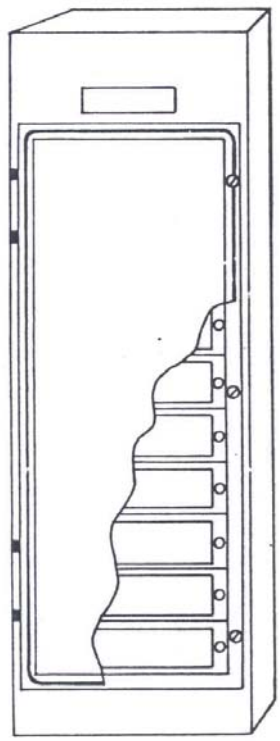
A standard cubicle, used by ABB Power Technologies, Sweden

Manufacturer	ABB Low voltage system
Type	MNS Select
Dimensions	2000x700x600
Degree of protection	IP21, IP43 or IP54
Ambient conditions	As per IEC 439-1
Standard colour	RAL 7035 structure, light grey
Front door	Glass door, hinged on the right side
Hinged frame	39 U-modules (1U=44,45 mm) and to accommodate 19" equipment.
Back plane	19" centred bracket for 41 U-modules
Ventilation	IP21 and IP43 are ventilated in top and in the bottom, both in the rear plane and in the front door. IP43 is completed with dust filter.
Locking	Front door has a pivot handle with lock insert
Cubicle light	All models has a lamp socket with front door operated switch. Suitable for E14, 240V lamp
Heater & thermostat	Included in IP43. Heater 240V, 100W. Thermostat operating range is +15 - +40 ºC
Legend plate	Engraved with text on grey background in top of the cubicle. Text high 15 mm.
Earthing bar	Horizontal earthing bar 30x10 mm with connection strip in bottom of the cubicle.

Same cubicle in parts



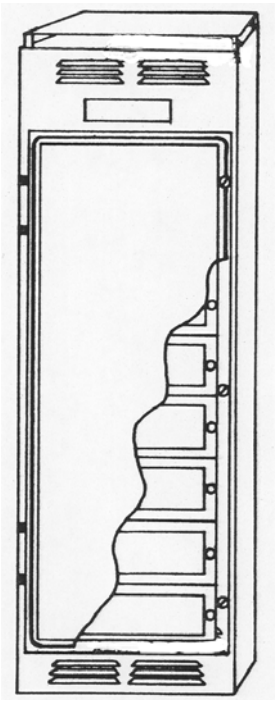
Standard design



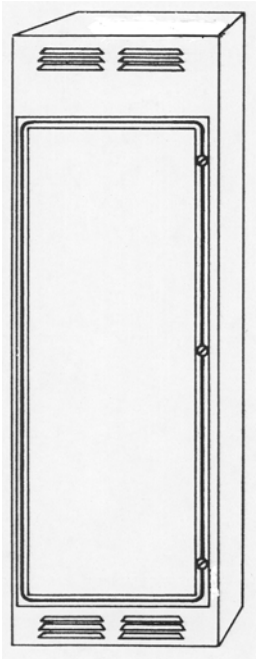
IP class 21 (IEC 529)

- Roof plate (not sealed)
- Door with window

Ventilated design



- Raised roof plate (not sealed)
- Vents in kick- and trim plane
- Door with window or rack doors



Sealed design, IP 54 (IEC 529)

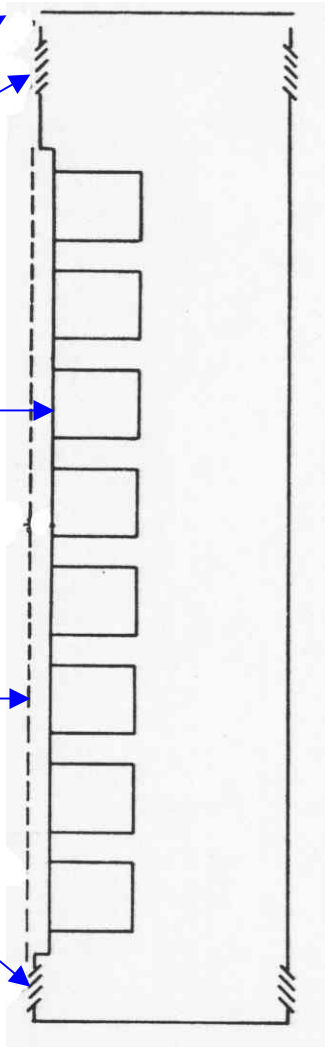
- Lowered and sealed roof plate
- Individuals doors in the front provided with sealing or a whole protective glass door (always sealed)

Tropical design, IP 43 (IEC 529)
The same as the sealed design but with following addition:

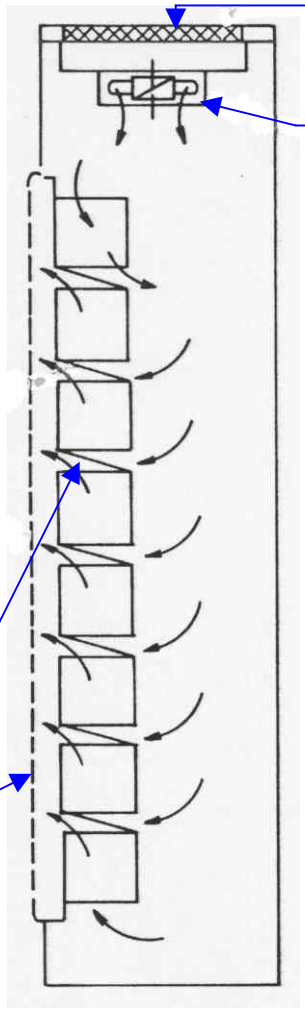
- The vents are provided with sceens (nets)
- The cubicle is provided with a sealed bottom plate
- The design shut out insects but permits ventilation

Ventilated design of cubicles

Common ventilation

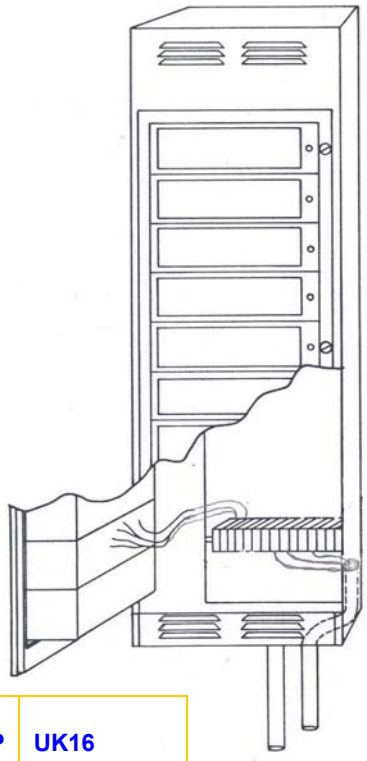


Forced ventilation



- Roof plate with air filter and a fan
- Air leading plates between the equipment frames (max 8 x 4U frames in the cubicle)
- When required, protective door with vents

Example of Terminal blocks and cables



Terminal blocks

Manufacturer	Phoenix
Type	**URTK6**, used in AC current circuits together with switch bar SB2-8-T or SB4-8-T
	URTK/S-BEN 10, used in AC voltage & DC Distribution circuits
	UK5-MTK-P/P, used for signals, i.e. alarm or event
	UK16, used for main DC circuits
Mounting	See manufacturer's recommendation

Assembling data	**URTK6**	**URTK/S-BEN 10**	**UK5-MTK-P/P**	**UK16**
Connectable conductor area acc. to IEC228 class 5, mm²	0,5 - 6	0,5 - 10	0,2 - 4	0,5 - 10
Rated current Acc. to IEC228 class 5, A	41	57	16	57
Rated voltage AC (V)	400	500	800	800
Dimensions H * L * W on top hat rail 35 x 15	51*91*8,2	66*61*8,2	66*51*6,2	54*42,5*10,2
Manufacturer's ordering No	3026272	0309109	3004032	3006014

Recommend cables

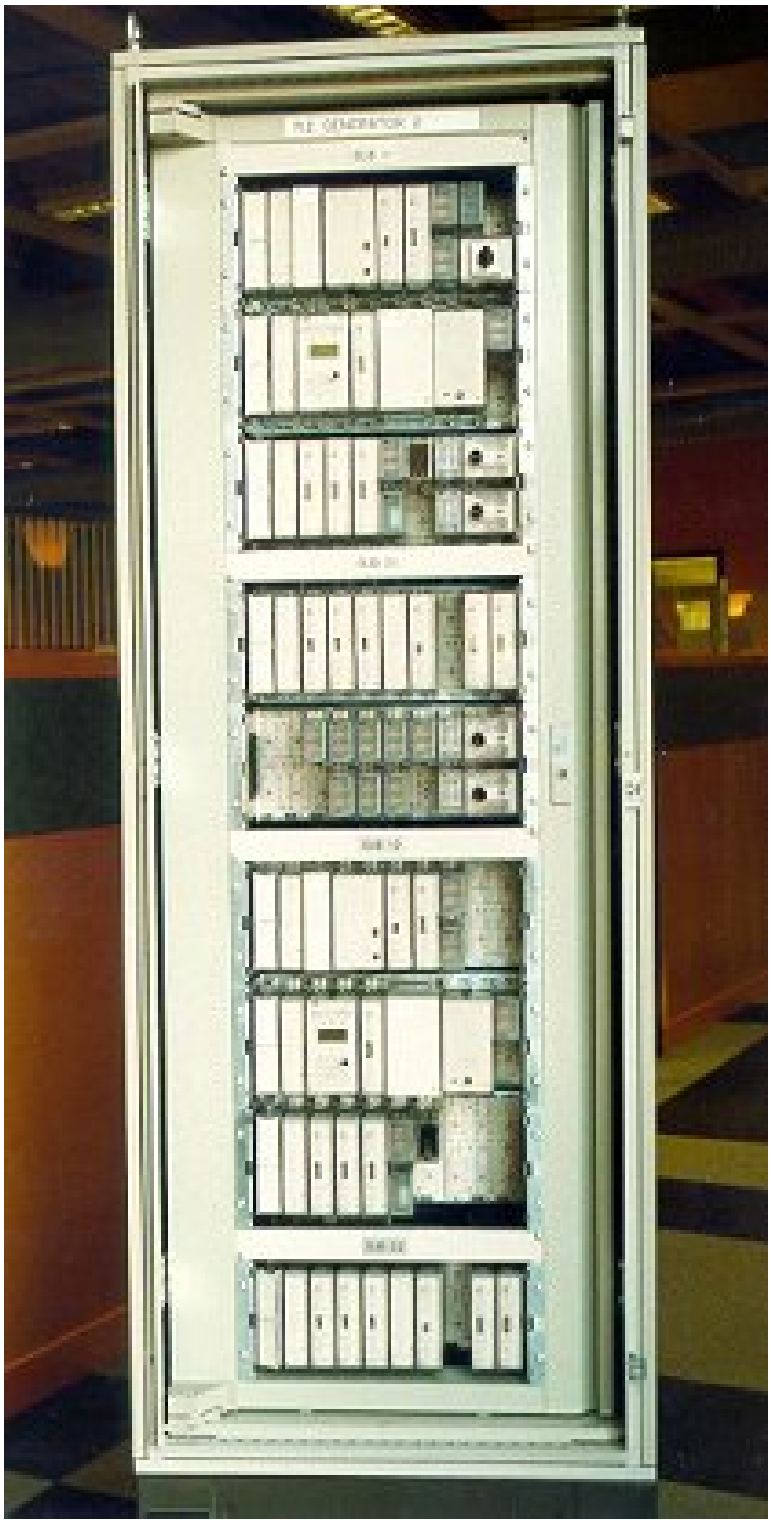
Type	H05V-K, H07V-K, acc. to Genelec HD 361, single core cables

Technical data

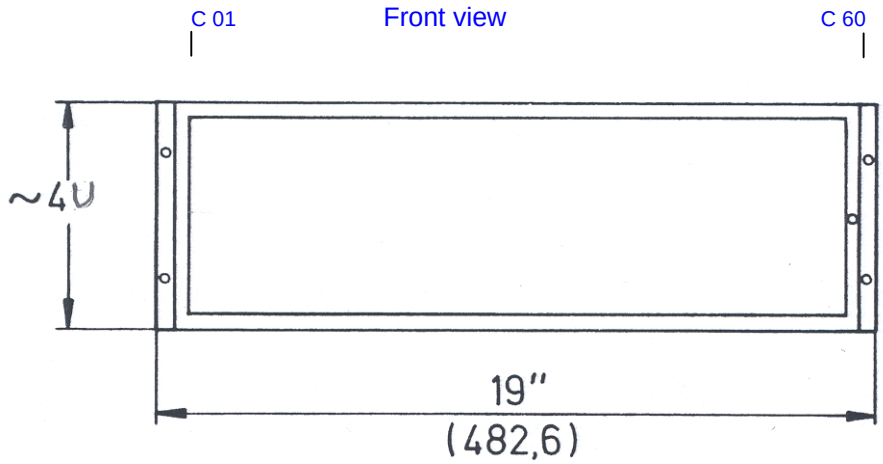
Rated voltage Uo/U	300/500V (H05V-K)
	450/750V (H07V-K)
Fire condition test	IEC 332-1, HD 405.1
Operating temperature	70º C
Temperature index	70º C
Material	Cu, tinned, multi-stranded flexible conductor, acc. to IEC 228 class 5, with PVC Type TI 1 insulation
Color	Grey (GY) or Green/Yellow (GN/YE) for protective earth conductors

Chapter 9 Identification system for rack and cubicle

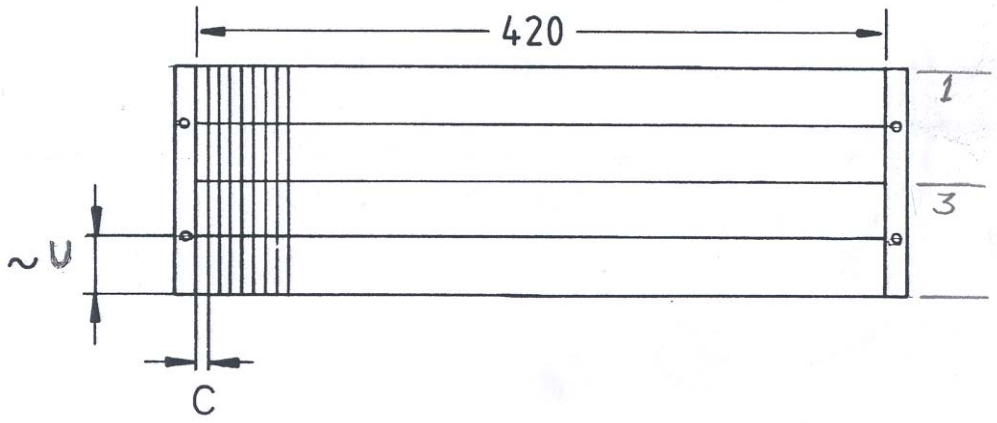
About this chapter
This chapter describes the identification system for COMBIFLEX and COMBITEST modules.



Identification system on rack level

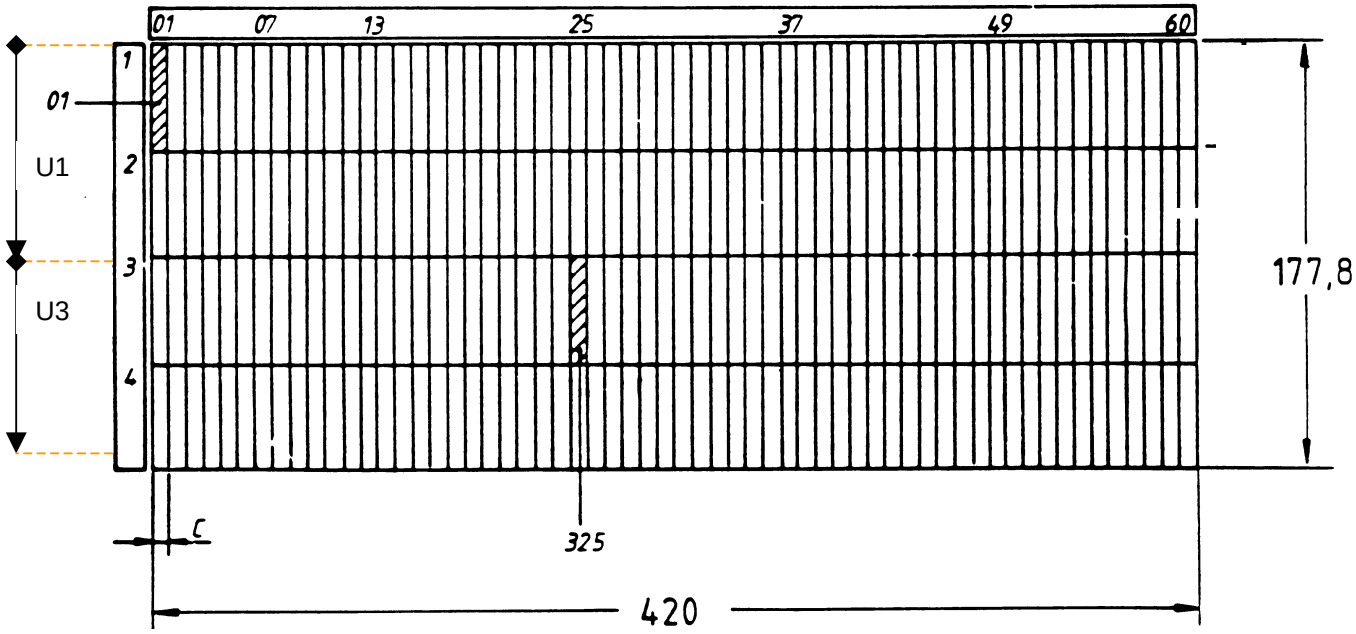


In a rack including COMBIFLEX relays only the designations U1, U3, U5 and U7 etc. are used since the relay modules are 2U or 4U high.

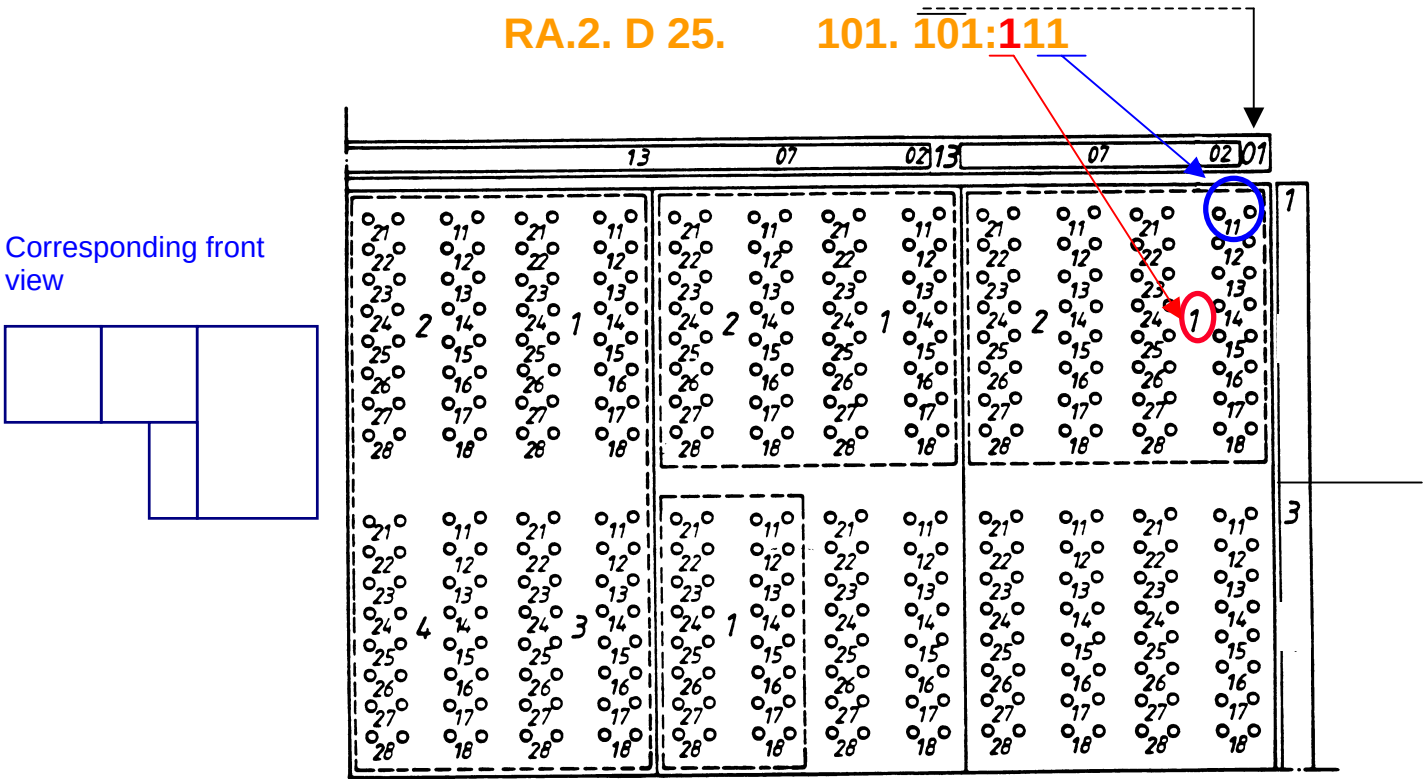


The modules U and C are forming a co-ordinate system

In 4U rack with COMBIFLEX modules only designations U1 and U3 are used.



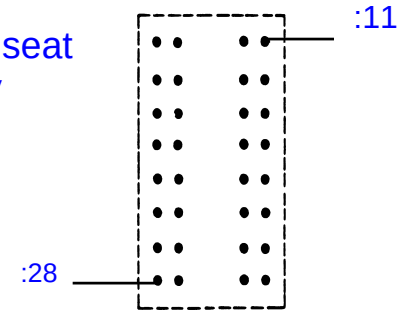
(Eg. In cubicle designation)



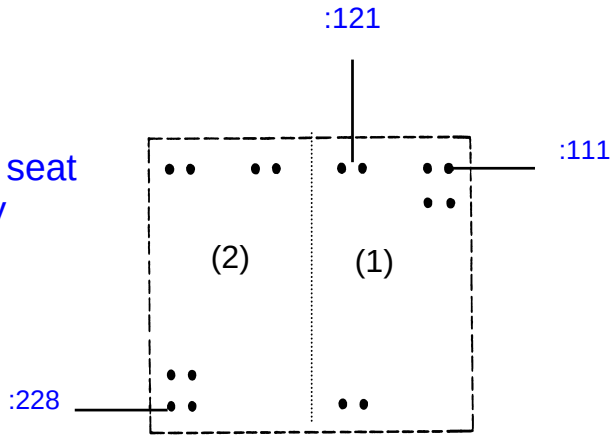
The protective relay assembly (RA.2.D25.101) mounted on three RX4 terminal bases, shown from the rear side (connection side).

Terminal identification on the relay modules shown from the rear side.

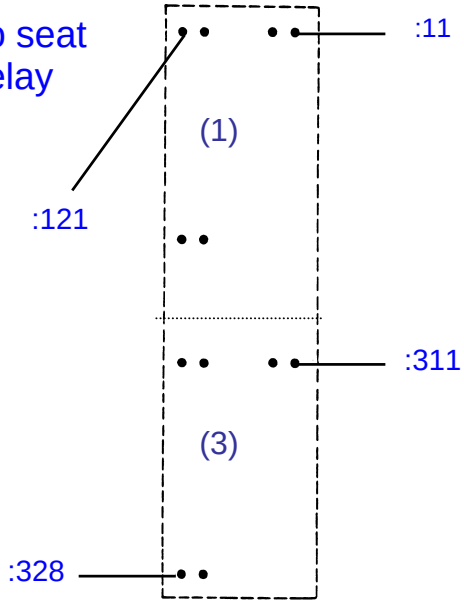
One seat relay



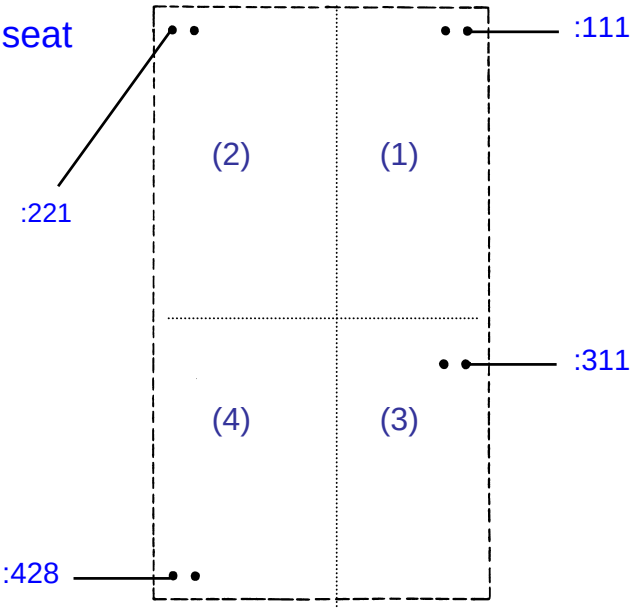
Two seat relay



Two seat H relay



Four seat relay



Terminal bases are marked with figures and letters according to figure 7.

The terminal designation for a relay unit depends on the size of mounted unit, not on the terminal base.

One and the same terminal, e.g. 21 (see figure 8) in a RX4 terminal base can get four different terminal designations depending on the size of the mounted relay unit.

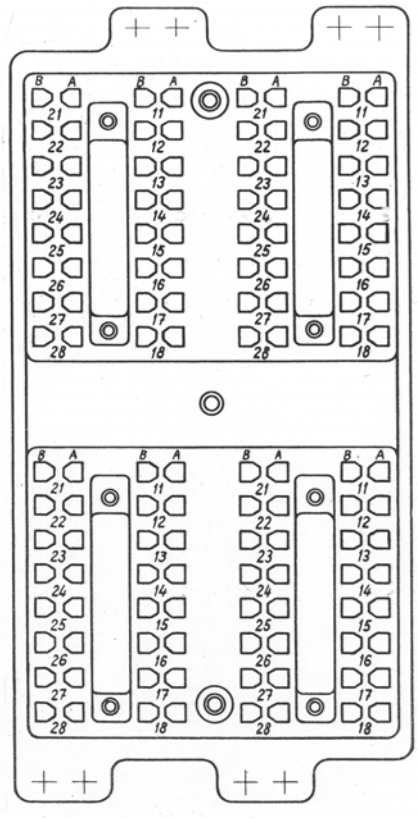


Fig.7

One seat relay mounted	Two seat relay mounted	2H seat relay mounted	four seat relay mounted

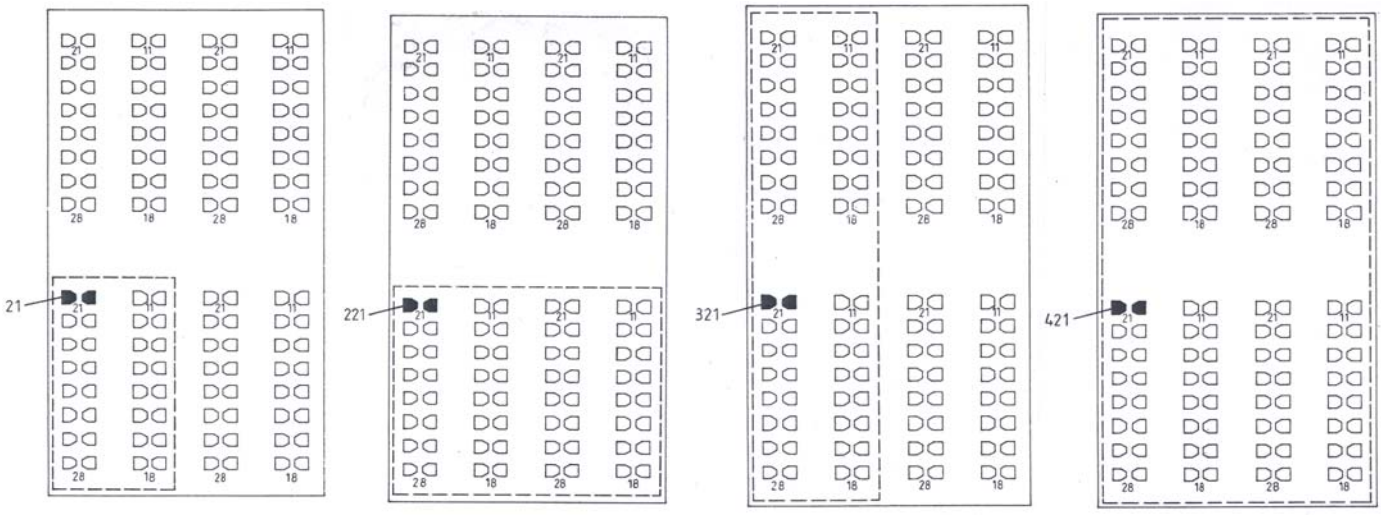


Fig.8 Terminal designation for different sizes of relay units (dotted lines) mounted on the RX4 terminal bases

The terminal designation always belongs to the relay

Application

To be able to locate a relay unit in a protective relay (relay assembly), the unit is identified with a unique item designation. Furthermore, the electrical connection point has a unique terminal designation. These designations are used on circuit diagrams, terminal diagrams and elsewhere to identify locations of the terminals and modules.

A circuit diagram for a protective relay (relay assembly) shows the units of which the protective relay is build up, the internal wiring between the units and the external connection of the relay. The terminal diagram shows in a simplified way the functioning of the protective relay and the external connection of the relay.

The item designations are based on a coordinate system of U and C modules and the terminal designations are based on the size of the unit. U describes the height of the module and C the width.
The U-module (44,45 mm = 1,75 in) derived from the 19" standard, is the vertical distance between the groups of holes in the fixing bars of the cubicles.
The C-module (7 mm = 0,28 in) is the horizontal distance between the mounting holes in the apparatus bars.

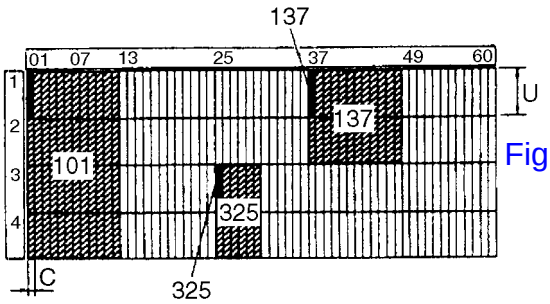


Fig. 9

Fig. 9 The U and C modules form a coordinate system. Note that the item designations of each units is the combination of U and C modules covered by that unit's upper left corner seen from the front, e.g. 101 and 325.

Illustration of item and terminal designation

The left unit of the protective relay (Relay assembly) in figure 10 has the item designation 101, where the first figure stands for the U-module position and the next two for the C-module position. The next unit, 107, has the same U-module position but has added 6C to the C-module position. Unit 331 has added 2U and 24C to its module position.

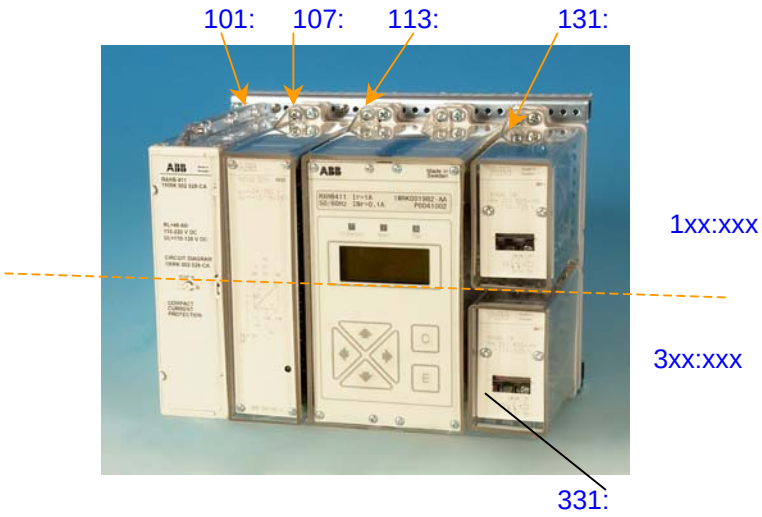


Fig 10
Item designation for relay units

A complete terminal designation for the protective relay shown in figure 10. consisting of e.g. the item designation 101 and the terminal designation 3A.
This terminal, 101:3A is encircled in the terminal diagram, see figure11.

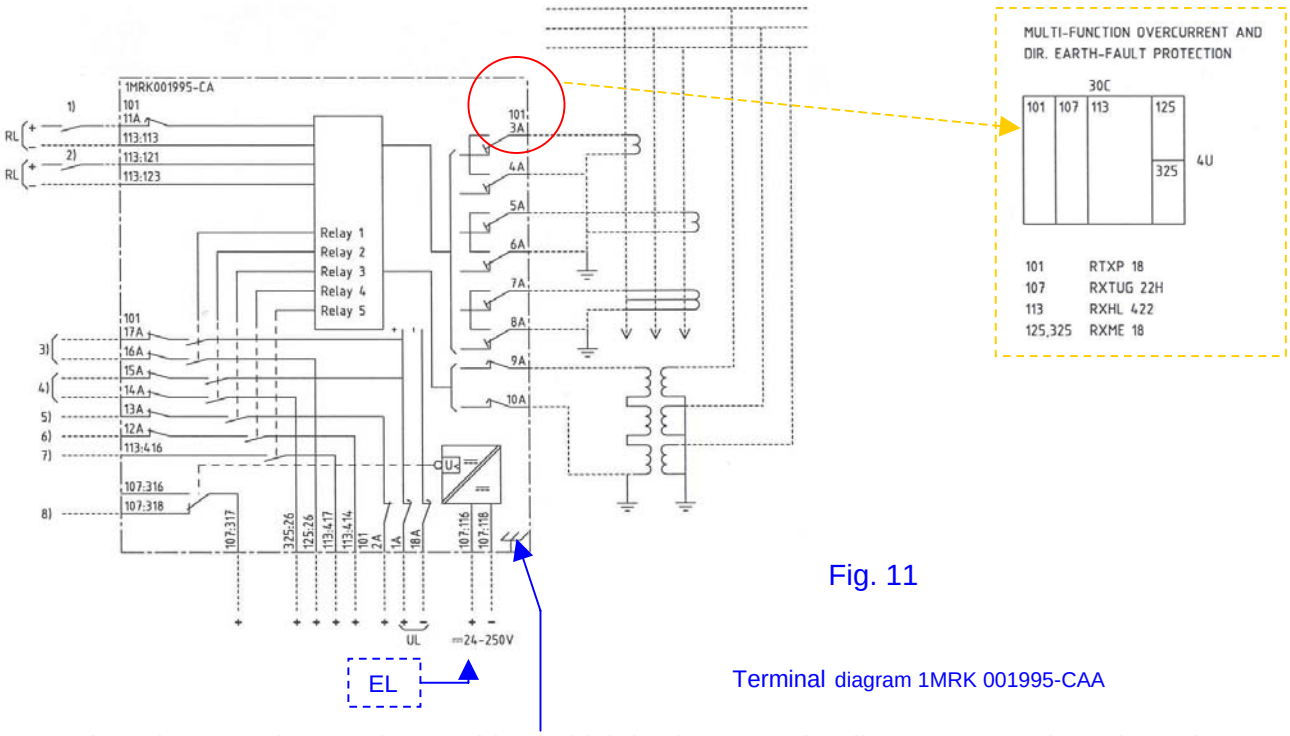
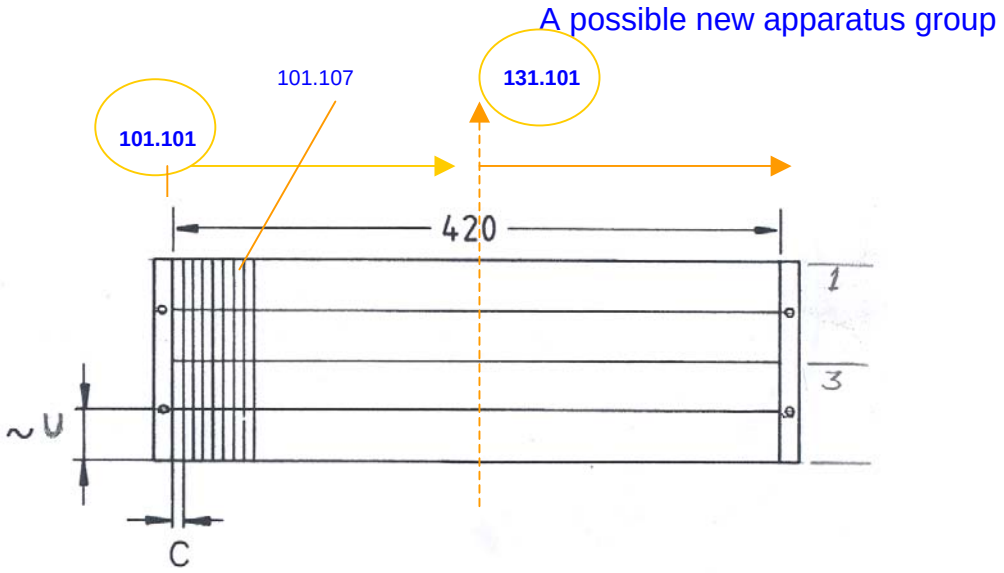


Fig. 11

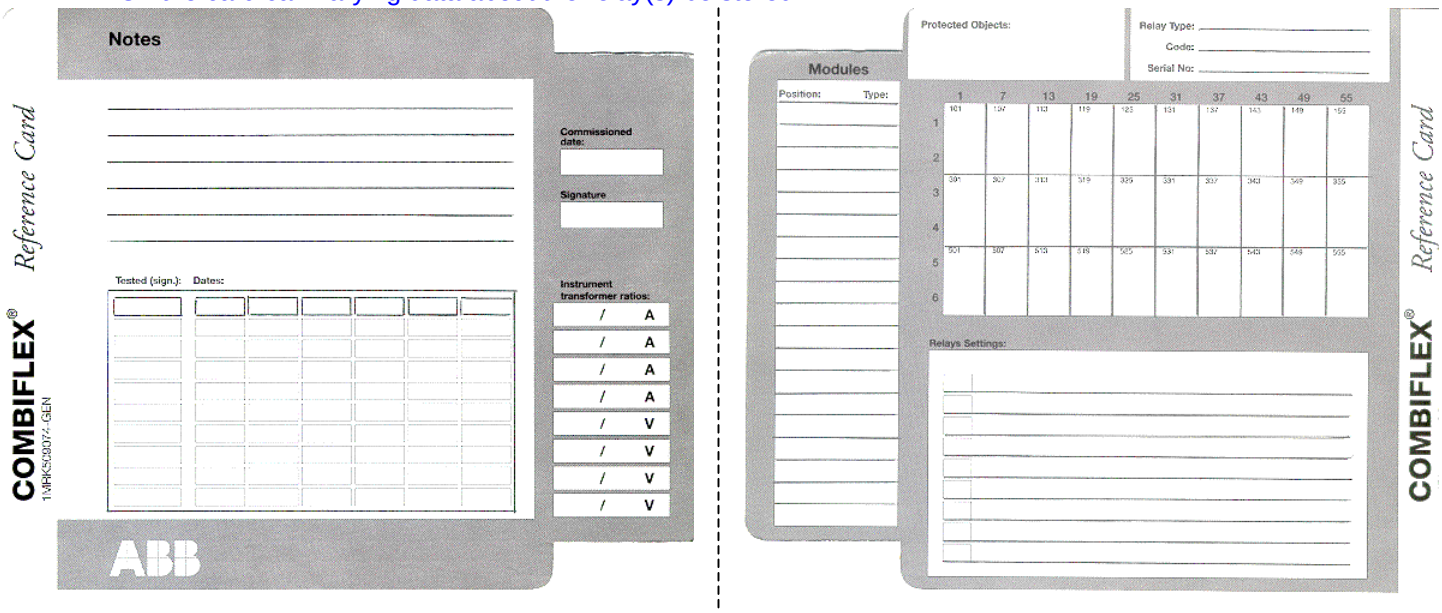
Terminal diagram 1MRK 001995-CAA

Some of the relays need a function earthing, which is shown on the diagram for each such a relay. This type of contact must be connected by a **not green/yellow wire** to the protective earthed equipment frame. On the ready made relay assemblies from the factory the contacts are already connected to the apparatus bar or equipment frame.

Fig. 14 Some of the terminals used in the internal connections in figure 13 (rear view)



A double-side reference card, Ordering No 1MRK 509 074-GEN can be insert between relay modules and/or apparatus groups in a 4U rack. Available for ordering in the package of 100 cards.
On the card can varying data about the relay(s) be stored.



Identification of the labels on the relays and relay assemblies, if applicable

= Connection point for protective earth

= A wrist ESD-bracelet shall be used when touching relay/equipment

= The equipment must be connected to protective earth before energizing

= This label is placed on all apparatuses/products, which are used on voltages exceeding 50 V ac/75 V dc and where the degree of protection is lower than IP 20.

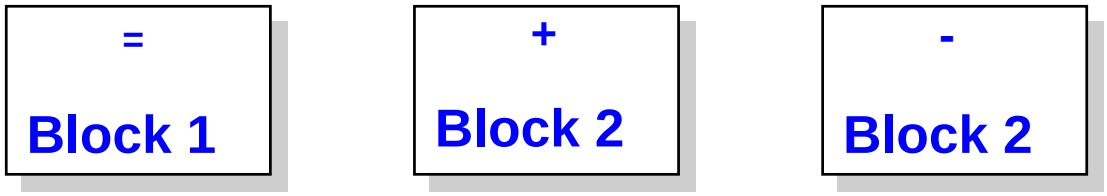
= To be on the safe side, **read the manual or instruction** regarding to this part!

Identification system on cubicle level

Item Designation System
(applied on relay cubicles)

The system is based on a recommendation by IEC (International Electronical Commission) year 1971, Publication 113-2

Main principles
The item designation system is built up around three designation blocks, block 1, block 2 and 3.

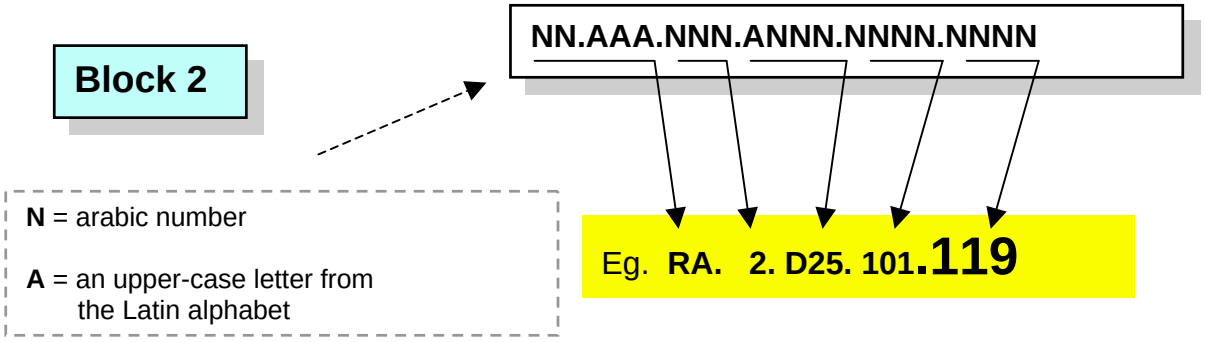


Block 1 Symbol **=** Gives item designations for the main parts of an installation or plant as well as for the systems and main components included the item.

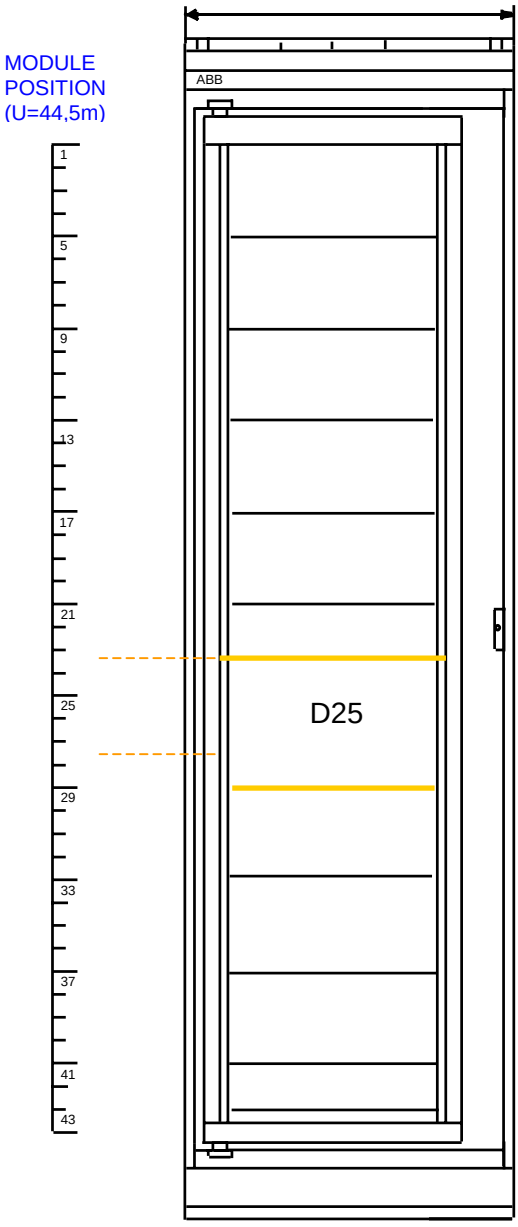
Block 2 Symbol **+** Contains item designations which are based on the physical location of the components in the installation.

Block 3 Symbol **-** Contains item designations for components based on their functional relationship with one another.

Each block is built up from a number of designation groups, separated by a point (**.**). Groups in the same block are inter-related in such a way that the designation in a certain group always corresponds to a sub-classification of the preceding group.



The measures of modules are based on IEC Publication 297, Dimension of panel and racks.



Designations used for mounting of different equipments:

C	Enclosed distribution board	**H**	High voltage switch-board
K	Control board	**U**	Switchyard
P	Control desk	**Z**	Separate located units
R	Relay protection		
S	Low voltage switch-board		

Eg. **RA. 2.**

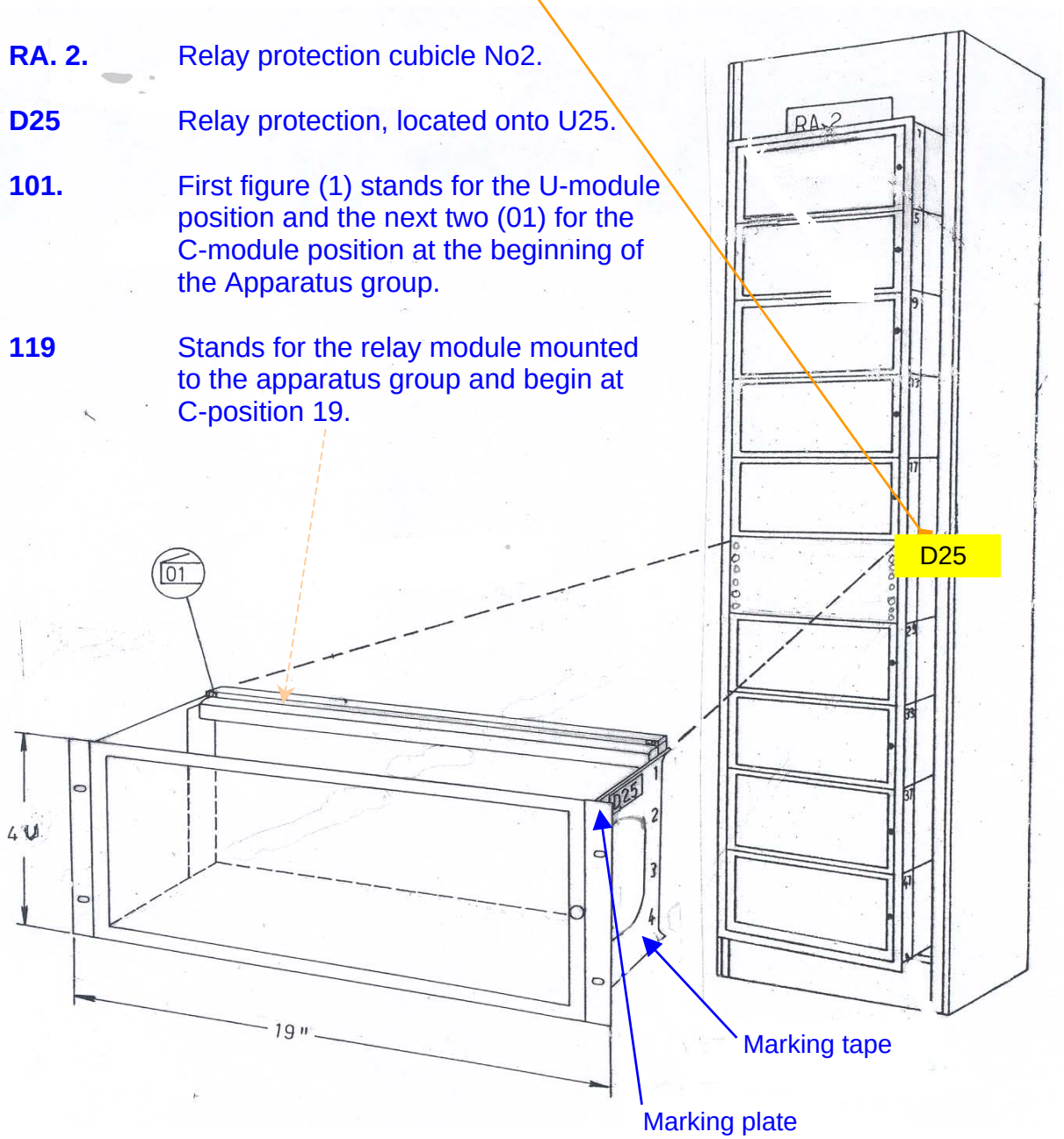
Eg. **RA. 2. D25. 101 .101.119**

RA. 2. Relay protection cubicle No2.

D25 Relay protection, located onto U25.

101. First figure (1) stands for the U-module position and the next two (01) for the C-module position at the beginning of the Apparatus group.

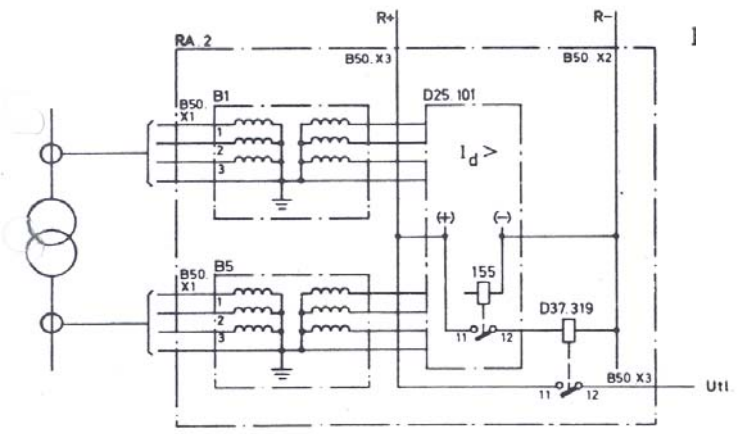
119 Stands for the relay module mounted to the apparatus group and begin at C-position 19.



Max. 10 equipment frames of 4 U can be installed to the cubicle.

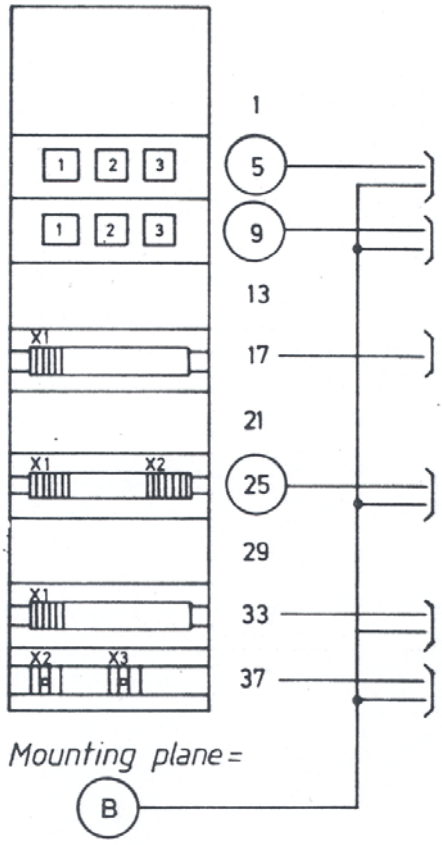
Example of the item designation system in a cubicle

Item designation in a circuit diagram



RA.2	**Relay cubicle RA.2**
.D25	**Equipment frame D25**
. 101	**Apparatus group 101**
. 155	**Apparatus (relay) 155**
:11	**Terminal 11**
.D37	**Equipment frame D37**
.319	**Relay 319**
:11	**Terminal 11**
.B1	**Apparatus plate on level B1**
.1	**Transformer 1**
.B50	**Row on the terminal blocks**
.X1	**Terminal group with connection blocks**

Example on item designation in the rear mounting plane B



Transformers on apparatus plate
B5.1 B5.2 B5.3
B9.1 B9.2 B9.3

D9.X1:1-(Related to equipment frame D9 on the D plane

Rows of terminal blocks B.
B25.X1:1- , B25.X2:1-

Rows of terminal blocks B50.X1:1-

Row of terminal blocks
B50.X2 B50.X3

ABB Power Technologies AB
Substation Automation
SE - 721 59 Västerås
Sweden
Telephone: +46 (0) 21 34 20 00
Facsimile: +46 (0) 21 14 69 18
www.abb.com/substationautomation