ACKSYS

COMMUNICATIONS AND SYSTEMS

MI400 Series
MI400/RTS Series
MI400-400 Series
&
RKMI, RDMI Options

INDUSTRIAL ADAPTER

RS232D/RS422A-RS485

TECHNICAL DOCUMENTATION

MI400 Series
MI400/RTS Series
MI400-400 Series
&
RKMI RDMI Options

INDUSTRIAL ADAPTER RS232D/RS422A-RS485

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SECTION 2 MI400 Series

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SECTION 1

General Presentation :

- **MI400**
- **MI400/RTS**
- **MI400-24V**
- **MI400-24V/RTS**
- **MI400-400**
- **RKMI400**
- **RKMI400 /RTS**
- **RDMI Option**
- **RKMI Option**

NOTES

MI400 , MI400/RTS , MI400-400 Series
RKMI, RDMI Options

	MI400 SERIES		MI400/RTS SERIES		MI400-400 SERIES	
	115V/230V	**24V**	**115V/230V**	**24V**	**115V/230V**	**24V**
BOX	MI400	MI400-24V[1]	MI400/RTS	MI400-24V/RTS[1]	MI400-400	
RACK	RKMI400		RKMI400/RTS			

- **RDMI Option :** Support plate for DIN RAIL available for all MI400, MI400/RTS, MI400-400 series in box format
  - MI400 + RDMI = RDMI400
  - MI400-24V + RDMI = RDMI400-24V
  - MI400/RTS + RDMI = RDMI400/RTS
  - MI400-24V/RTS + RDMI = RDMI400-24V/RTS
  - MI400-400 + RDMI = RDMI400-400

- **RKMI Option :** 19 ″ RACK available for RKMI400 & RKMI400/RTS

5 YEAR GUARANTEE, PARTS AND LABOUR
(except protection elements)

[1] MI400-24V & MI400-24V/RTS always sold with RDMI Option

MECHANICAL CHARACTERISTICS

MI400, MI400/RTS
10/10 mm stackable sheet steel box, (maximum 4 boxes) with fast locking, supplied with fixing angle brackets allowing vertical or horizontal (above/below) mounting, finished in textured epoxy powder and equipped with:

RKMI400, RKMI400/RTS
Simple Europe format board with 9F aluminium front. Natural anodised finish. Extraction handle and ¼ turn fast locking, equipped with:

REAR

RS232D side
- 1 SUB D 9 point male connector (EIA 574 "IBM PC type") and, as an option, 1 SUB D 25 point male or female connector for MI400 & RKMI400
- 1 SUB D 9 point male connector (EIA 574 "IBM PC type"), 2 configuration DIP switches for automatic transmission control (CAT) for MI400/RTS & RKMI400/RTS

RS422A-RS485 side
- male screw-in connecting terminal with 5 pins (female locking connector and protective cover supplied).
- 1 power cable

FRONT

- 3 configuration dip switches
- 6 indicator LEDs

configuration is possible without dismounting the box (or the board for the **RKMI400** version).

At the level of the bottom cover (or the soldered side of the printed circuit for the **RKMI400** version):

- access to strap ST2 of the anti-lightning option

MI400 & MI400/RTS Series

Indicators:

- power indicator
- TX, RX, RTS/DTR, CTS, DSR/DCD signal status indicators

Configuration:

- selection of DTE/DCE, RS422A/RS485
- ECHO = transmission/reception looping in RS485 mode
- selection of transmission control signal (RTS, DTR or permanent transmission)
- selection of control signal status (DCD, DSR, CTS) active, inactive, controlled by RTS or DTR
- selection of CTS timeout (0 ms or 20 ms)
- selection of termination resistors (RS422A and RS485)
- selection of line bias (RS422A and RS485)

MI400/RTS Series only **:**

- selection of frame format
- selection of automatic transmission validation by RTS, DTR or in PERMANENT mode

MI400-400 Series

Indicators:

- Power indicator (PWR)
- For line A TXA & RXA signal status indicators
- For line B TXB & RXB signal status indicators

Configuration:

- selection of termination resistors (RS422A and RS485)
- selection of line bias (RS422A and RS485)
- selection of frame format
- automatic transmission control (CAT)

RKMI

19" 3U rack (EUROPAC-RATIONAL 84F) in aluminium, natural anodised finish, with handles, main switch equipped with protective cover, main fuse and power cable. It can take 8 **RKMI400** boards (or any other boards in **rack** format) and it provides power distribution to the boards. The rear is closed with windows for the various **RKMI** board connectors.

RDMI

Supporting plate for attaching up to 3 boxes on symmetrical sections (DIN RAIL) as per EN 50022 (only 1 MI400-400 per rail).

Dimensions and weight:

MI400
length: 180 mm width: 102 mm
thickness: 50.5 mm weight: 970 g max

MI400/RTS
length: 180 mm width: 102 mm
thickness: 50.5 mm weight: 980 g max

MI400-24V
length: 180 mm width: 102 mm
thickness: 50.5 mm weight: 820 g max

MI400-24V/RTS
length: 180 mm width: 102 mm
thickness: 50.5 mm weight: 830 g max

MI400-400
length: 180 mm width: 100 mm
thickness: 88 mm weight: 1430 g max

RKMI400
length: 169 mm width: 100 mm
thickness: 45.5 mm weight: 380 g max

RKMI400/RTS
length: 169 mm width: 100 mm
thickness: 45.5 mm weight: 390 g max

RKMI
width: 483 mm height: 132.5 mm
depth: 213 mm weight: 2280 g empty

RDMI
width: 185 mm height: 102 mm
depth: 23.5 mm from the rail
weight: 150 g empty

Temperature range

- 5°C to + 65°C

Humidity

0 to 95% RH, without condensation

ELECTRICAL CHARACTERISTICS

Power supply	
230 V A.C. version	**148 V A.C. to 253 V A.C.**
(115 V A.C. version on option)	**74 V A.C. to 127 V A.C.**
	50/60 Hz
	6 VA maximum ; (MI400-400→12VA).
	FCC and VDE 0871 limit B
	Power cable 2 metres long, equipped with a 16 A 2 free connector + EUROPEAN standard ground
24 V D.C. power supply	20V D.C. to 30V D.C.(cons. current 150 mA)
Protection against transient network overvoltages and overcurrents	By GE-MOV, ignition voltage 275 V A.C., absorption capacity 14 joules and 0.1 amp fuse temporising the mains current limitation.
Protection against mains supply brownouts(operation reserve)	Minimum **100 ms** at 230 V A.C.
Transmission type	Asynchronous, full duplex, half-duplex, simplex.
System interface (execpt MI400-400)	EIA RS232D/CCITT V24, EIA 574
Line interface	EIA RS422A - EIA RS485/CCITT V11
Signals converted	RX and TX
Control signals (execpt MI400-400)	**RTS** or **DTR** allowing transmission validation, RTS or DTR at **0** = transmitter enabled RTS or DTR at **1** = transmitter disabled Or by the **CAT** circuit (automatic transmission validation) available on models **MI400/RTS Series** only.
Other signals (execpt MI400-400)	CTS, DSR, DCD
Speed (NRZ)	**0 to 115.2 Kbits /sec** minimum, 250 Kbits/sec typical. **150 to 115.2 Kbits/sec** for models **MI400/RTS and RKMI400/RTS**
Maximum line voltage in common mode	± 7 V

Distortion (deviation in relation to I/O pulses)	**0.2% at 112 Kbits/sec** 1.8% at 250 Kbits/sec
Input/output delay	**< 1 µsec**
Maximum load in RS422A (limited by EIA standard)	10 receivers
Maximum load in RS485 (limited by EIA standard)	32 transmitters/receivers
Maximum load in RS422A or RS485 HOMOGENOUS NETWORK based on MI400xxx, RKMI400xxx	**256** interfaces
Input resistor (RS422A or RS485 interface)	**70** Kohms minimal, **96** Kohms typical.
Maximum transmission, line interface distance (RS422A-RS485) (limited by EIA standard, depending on the speed and type of cable used)	1,200 meters for 24 gauge (0.22 mm²) cable with a capacity of 50 pF/m between conductors
Type of cable to use (RS422A-RS485)	24 gauge twisted pairs, 50 pF/m, and nominal impedance of 120 Ohms. High interference in industrial environments, requiring use of a ground screen (capacity between ground screen and conductor and 75 pF/m)
Transmission, system interface distance (RS232D)	Minimum 15 meters
Protection against transient overvoltages (RS232D)	By peaks, breakdown voltage ± 7 V in common mode, ± 14 V in differential mode, absorption capacity: 0.4 kW for 1 ms.

Protection against permanent overvoltages (RS422A-RS485)	High voltage varistors, maximum default line voltage in differential mode:
without "lightning" option	**130 V D.C. permanently** **300 V A.C. for 20 minutes** **(direct connection with mains)**
with "lightning" option	**140 V A.C. for 20 minutes**
Protection against lightning (RS442A-RS485) Ground connection mandatory.	Gas spark arrestor (option) **20,000 A 8/20 µsec exposure.**
Protection against transient overvoltages(RS232D)	By peaks, breakdown voltage ± 25 V in common mode, absorption capacity: 0.3 kW for 1 ms.
Protection against electrostatic discharges as per IEC 801-2 (RS422A-RS485) The upper limit of the standard is greatly exceeded (level 4 voltage 15 KV maximum). In addition, the standard only stipulates single discharges applied to the outer envelope of the product to be tested and not directly on the signal.	Line side with "lightning" option (RS422A-RS485) Single strike test: **> 21 KV** Pulse test at 20 Hz: length **1** sec = **> 21 KV** length **5** sec = **> 21 KV** Line side without "lightning" option Single strike test: **> 21 KV** Pulse test at 20 Hz: length **1** sec = **> 20 KV** System side (RS232D) Single strike test: **> 21 KV** Pulse test at 20 Hz: length **1** sec = **> 21 KV** length **5** sec = **> 21 KV** On the box: **25 KV** (single strike and pulse)

Galvanic isolation (test voltage 1 minute)	Optoconnectors and transformer. Mains at high isolation: **5 KV effective**.
RS422A-RS485/RS232D (without “lightning option”)	**Minimum 4,000 V effective** Typically 5,000 V effective
RS422A-RS485/mains (without “lightning option”)	**5,000 V effective**
RS232D/mains	**3,000 V effective** (isolation rupture owing to ground connection)
Immunity to transients (RS422A-RS485)	**10,000 V/µs at Vcm = 1,000 V**

NOTES

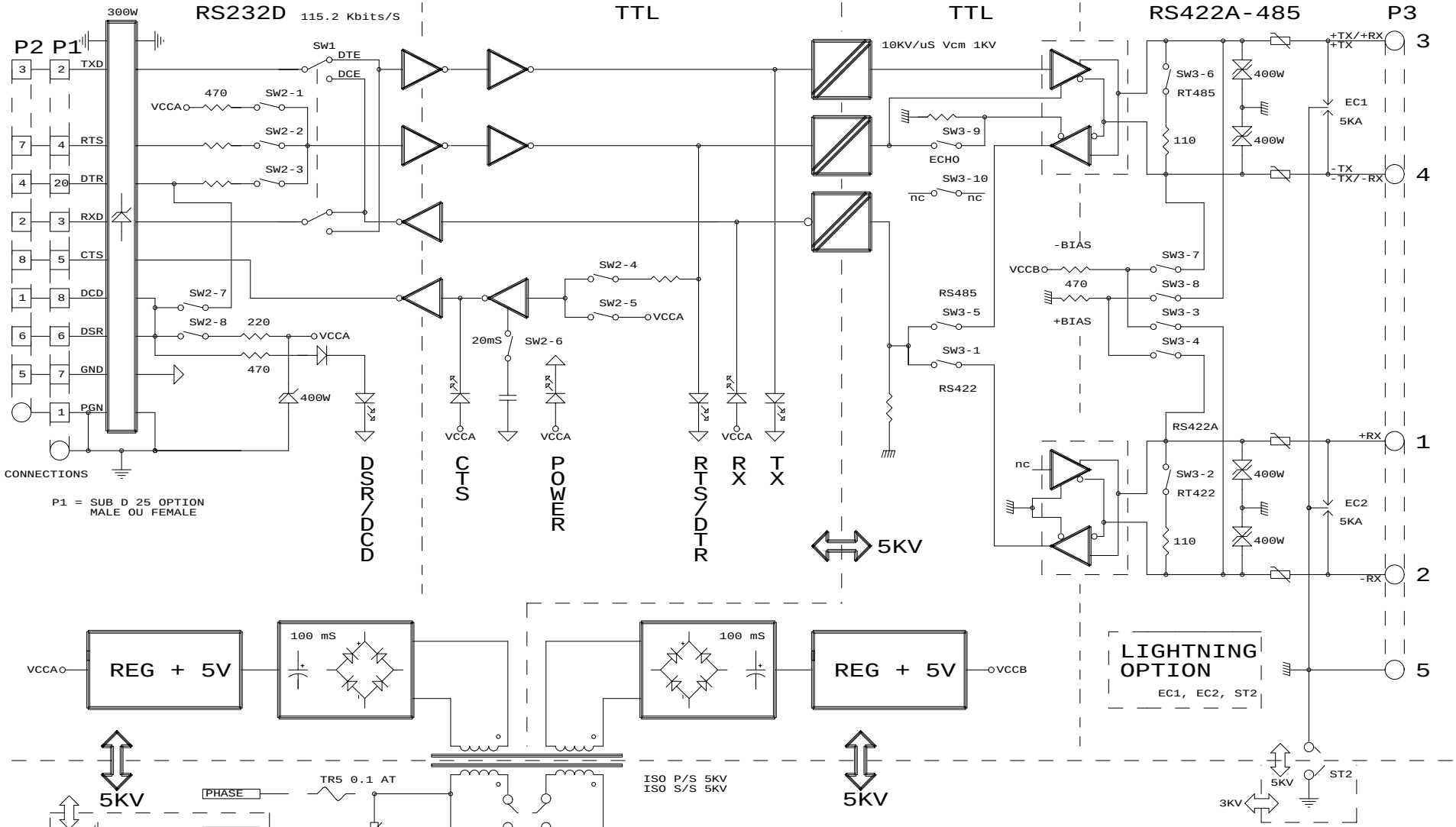
SECTION 2

MI400 Series :

- **MI400**
- **RKMI400**
- **MI400-24V**

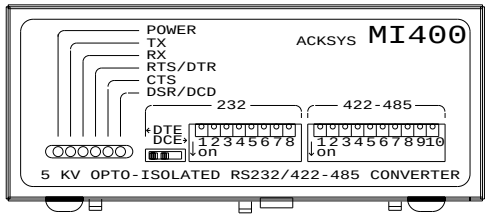
NOTES

MI400 SERIES



MI400
CONNECTORS AND SWITCHES

FRONT



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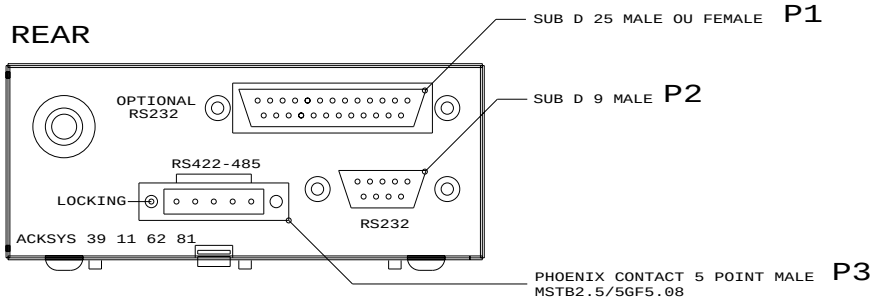
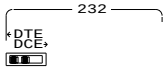


L.E.D. AT FRONT

signal " ON " signal " OFF "

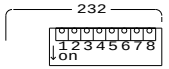


SW1

SW1 = DTE/DCE INTERFACE SELECTION

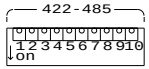
DTE = ex P.C.
ex TERMINAL

DCE = ex MODEM
ex MINI



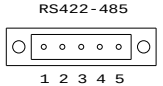
SW2

1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL



SW3

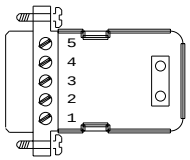
1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNSUSED



P3

RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND

SEE CONFIGURATION TABLE PAGE 2-6



FEMALE LINE CONNECTOR (P3)

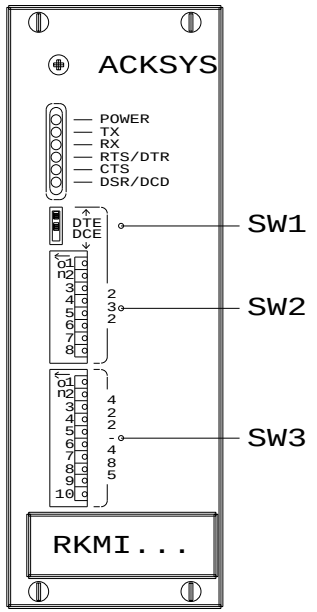
SCREW CONNECTOR +
CABLE COVER WITH PHOENIX
CONTACT 5 POINT FEMALE
STRAPS MSTB2.5/5STF5.08

18 GAUGE MAXIMUM 2.5 mm2

RKMI400

CONNECTORS AND SWITHES

FRONT



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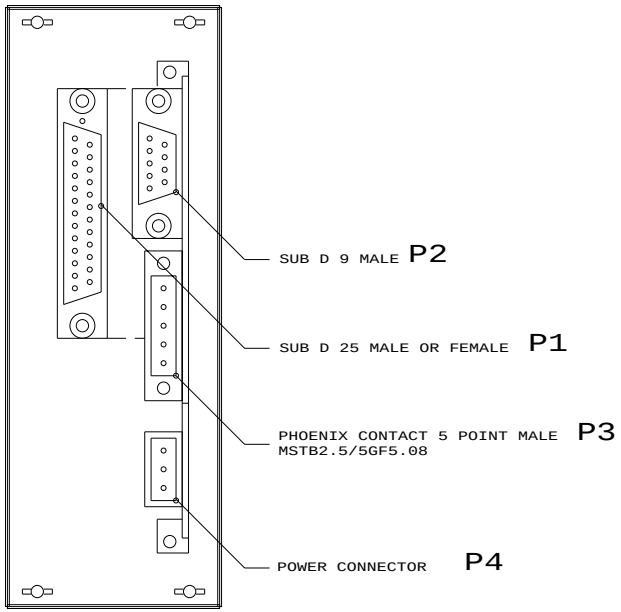
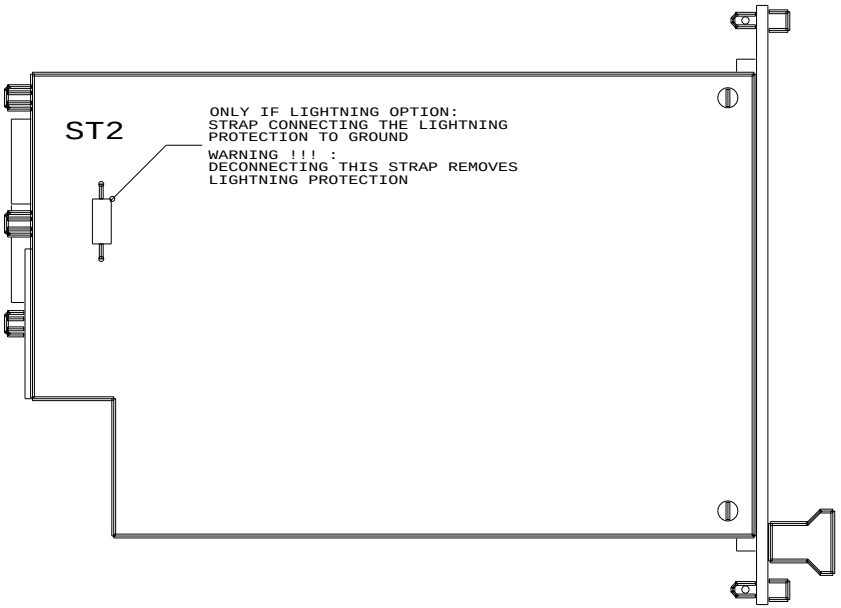
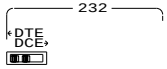
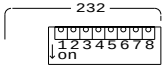
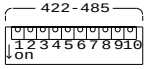










SW1

SW1 = DTE/DCE
INTERFACE SELECTION

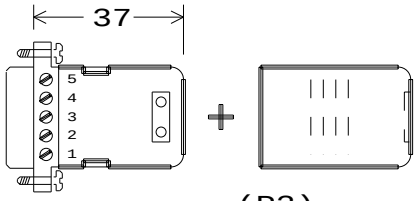
SW2

1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL

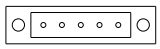
SW3

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNSUSED

SEE CONFIGURATION TABLE PAGE 2-6



FEMALE LINE CONNECTOR (P3)
SCREW CONNECTOR +
CABLE COVER WITH PHEONIX
CONTACT 5 POINT FEMALE
STRAPS MSTB2.5/5STF5.08
18 GAUGE MAXIMUM 2.5 mm2



P3

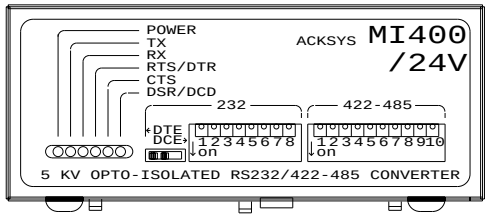
RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND

L.E.D. ON FRONT

signal " ON " signal " OFF "

MI400-24V
CONNECTOR AND SWITCHES

FRONT



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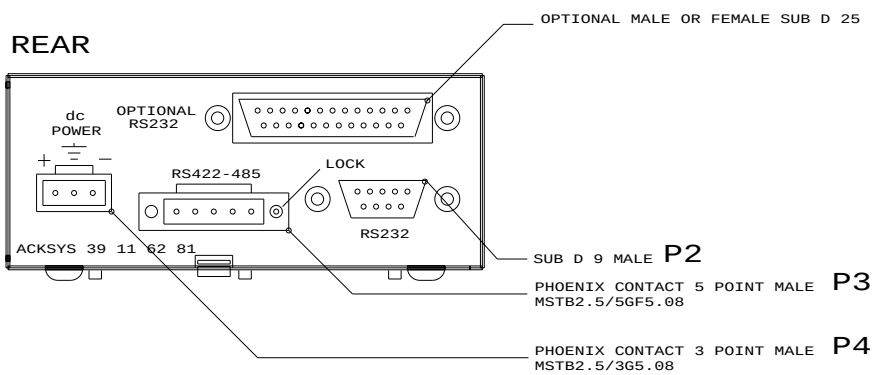
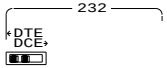


L.E.D. ON FRONT

signal " ON " signal " OFF "

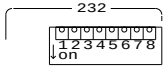


SW1

SW1 = DTE/DCE INTERFACE SELECTION

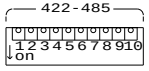
DTE = ex P.C.
ex TERMINAL

DCE = ex MODEM
ex MINI



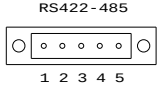
SW2

1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL



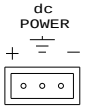
SW3

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNSUSED



P3

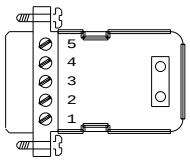
RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND



P4

20 Vdc to 30 Vdc
150 mA Max

SEE CONFIGURATION TABLE PAGE 2-6



FEMALE LINE CONNECTOR (P3)

SCREW CONNECTEUR + CABLE COVER WITH PHEONIX CONTACT 5 POINT FEMALE STRAPS MSTB2.5/5STF5.08

18 GAUGE MAXIMUM 2.5 mm2

FEMALE POWER CONNECTOR (P4)

PHOENIX CONTACT 3 POINT FEMALE MSTB2.5/3ST5.08

18 GAUGE MAXIMUM 2.5 mm2

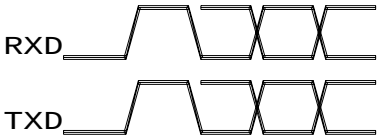
ISOLATIONS:	5 KVdc between RS232 and RS422A/485
	2,5 KVdc between RS232 and +- 24Vdc
	2,5 KVdc between RS422/485 and +- 24Vdc

MI400 SERIES

SIGNALS TIMING DIAGRAM FOR RS232D/RS422A-RS485 COMMUNICATIONS INTERFACES

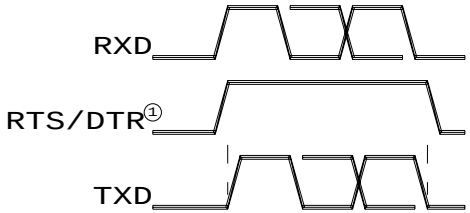
FULL-DUPLEX
PERMANENT TRANSMISSION VALIDATION

" DTE " TYPE INTERFACE EQUIPMENT



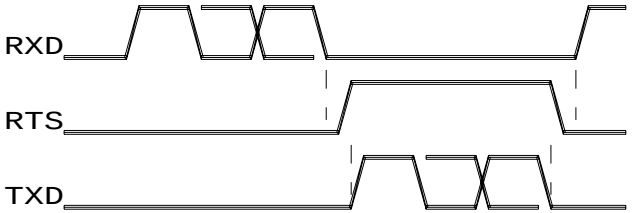
FULL-DUPLEX
CONTROLLED TRANSMISSION VALIDATION

" DTE " TYPE INTERFACE EQUIPMENT



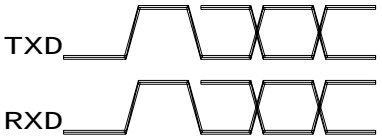
HALF-DUPLEX
CONTROLLED TRANSMISSION VALIDATION

" DTE " TYPE INTERFACE EQUIPMENT

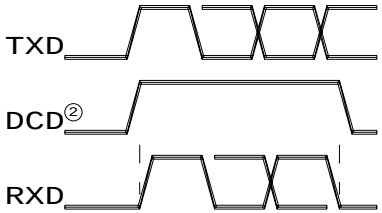


① = IN CERTAIN APPLICATIONS, DTR CAN BE USED AS A VALIDATION SIGNAL TO DETECT BREAKS IN THE POWER SUPPLY.

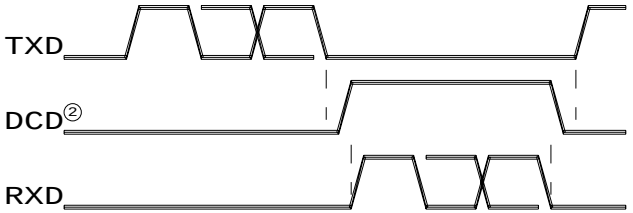
" DCE " TYPE INTERFACE EQUIPMENT



" DCE " TYPE INTERFACE EQUIPMENT



" DCE " TYPE INTERFACE EQUIPMENT



② = FOR " DCE " TYPE EQUIPMENT, CONNECT THE DCD SIGNAL TO PIN 7 OF P1 OR PIN 4 OF P2 (RTS SIGNAL). SEE " DCE " TYPE CABLING

MI400 SERIES
SW1, SW2, SW3 SWITCH SETTINGS

RS232

SW2 — 232

1 2 3 4 5 6 7 8 on	PERMANENT TRANSMISSION VALIDATION
1 2 3 4 5 6 7 8 on	TRANSMISSION VALIDATION CONTROL BY RTS
1 2 3 4 5 6 7 8 on	TRANSMISSION VALIDATION CONTROL BY DTR
1 2 3 4 5 6 7 8 on	CTS CONTROL BY RTS/DTR
1 2 3 4 5 6 7 8 on	CTS PERMANENTLY ENABLED
1 2 3 4 5 6 7 8 on	CTS DELAY 20 mS
1 2 3 4 5 6 7 8 on	CTS DELAY 0 mS
1 2 3 4 5 6 7 8 on	DSR/DCD CONTROL BY DTR
1 2 3 4 5 6 7 8 on	DSR/DCD PERMANENTLY ENABLED
1 2 3 4 5 6 7 8 on	DSR/DCD DISABLED

RS485

SW3 — 422-485

1 2 3 4 5 6 7 8 9 10 on	RS485 MODE
1 2 3 4 5 6 7 8 9 10 on	WITH ECHO
1 2 3 4 5 6 7 8 9 10 on	WITHOUT ECHO
1 2 3 4 5 6 7 8 9 10 on	WITH LINE BIAS
1 2 3 4 5 6 7 8 9 10 on	WITHOUT LINE BIAS
1 2 3 4 5 6 7 8 9 10 on	WITH TERMINATION RESISTOR
1 2 3 4 5 6 7 8 9 10 on	WITHOUT TERMINATION RESISTOR

RS422A

SW3 — 422-485

1 2 3 4 5 6 7 8 9 10 on	RS422A MODE
1 2 3 4 5 6 7 8 9 10 on	WITH LINE BIAS
1 2 3 4 5 6 7 8 9 10 on	WITHOUT LINE BIAS
1 2 3 4 5 6 7 8 9 10 on	WITH TERMINATION RESISTOR
1 2 3 4 5 6 7 8 9 10 on	WITHOUT TERMINATION RESISTOR

RS232

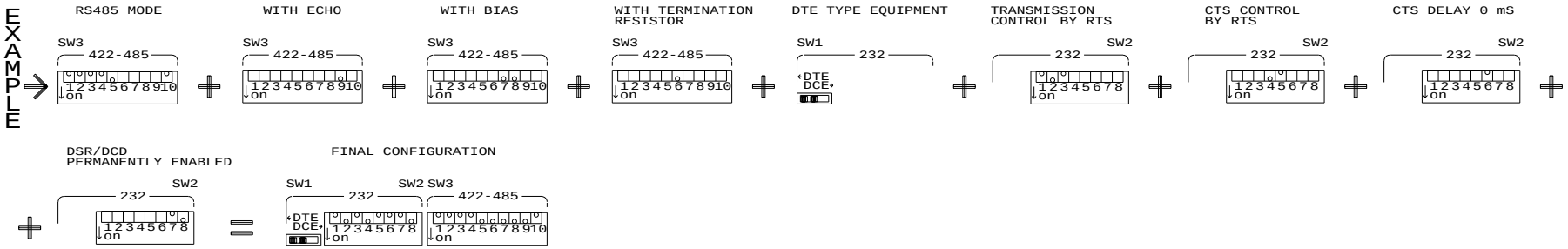
SELECTION OF TYPE OF EQUIPMENT WITH WICH TO INTERFACE (DTE or DCE)

SW1 — 232	SW1 — 232
*DTE DCE	DTE DCE*
DTE	DCE

DTE = P.C. , TERMINAL ...

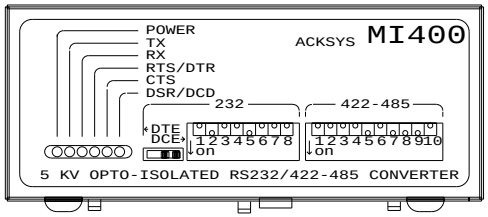
DCE = MODEM , MINI ...

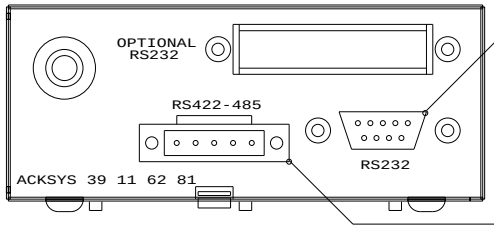
EXAMPLE



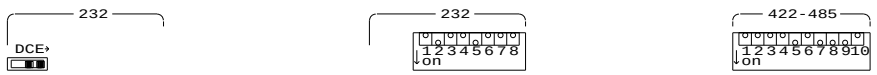
MI400 SERIES

RTS SIGNAL GENERATION BY BRIDGING THE RX (DCE)
CONFIGURATION No 1





FRONT PANEL SETTINGS



RS232 TYPE DCE EQUIPMENT (MODEM) - TRANSMISSION VALIDATION CONTROL BY RTS
CTS PERMANENTLY ENABLED - CTS DELAY 0 ms - DSR/DCD DISABLED
RS485 MODE - WITHOUT ECHO - WITH LINE BIAS - WITHOUT TERMINATION RESISTOR

USAGE RESTRICTIONS FOR RTS SIGNAL GENERATION BY BRIDGING WITH THE RX SIGNAL

- COMMUNICATION SPEED LIMIT: 56 Kbds/s LINE LENGTH 200 m MAXIMUM
  9,6 Kbds/s WITH LINE LENGTH 1 Km MAXIMUM
- MAXIMUM NUMBER OF RS485 INTERFACES: MAXIMUM 20 IF HETEROGENEOUS NETWORK
  MAXIMUM 116 IF MI400 BASED HOMOGENEOUS NETWORK
- DO NOT USE LINE TERMINATION RESISTORS
- LINE BIAS SUPPLIED BY THE MI400 CONVERTER
- ENVIRONEMENT FREE FROM MAJOR INTERFERENCE
- SHIELDED CABLE RECOMMENDED

(TEST FOR IMMUNITY TO RAPID BURST TRANSMISSION ON A LENGTH OF 1 Km
AT 56 Kbds/s (FOLLOWING NF EN 61000-4-4): > 2,3 KV)

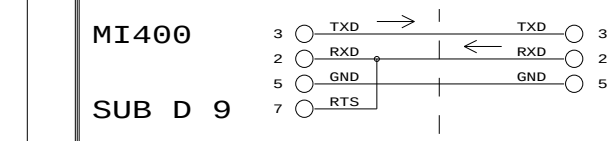
FRONT PANEL L.E.D. STATUS

signal " ON "	signal " OFF "	signal " BLINKING "	
POWER , CTS	TX , RX , RTS/DTR , DSR/DCD		IDLE
POWER , CTS	TX , RTS/DTR , DSR/DCD	RX	RECEPTION
POWER , CTS	RX , DSR/DCD	TX , RTS/DTR	TRANSMISSION

RS232 INTERFACE

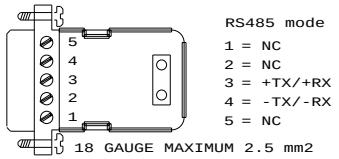
RTS SIGNAL GENERATION BY BRIDGING THE RX SIGNAL

CONNECTION WITH " DCE " EQUIPMENT



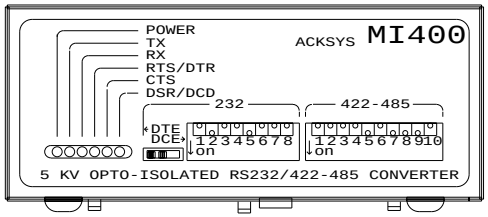
RS485 INTERFACE

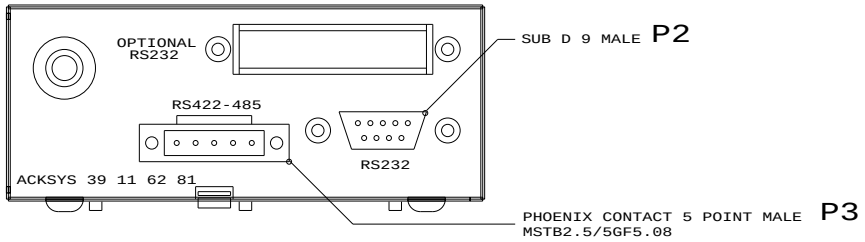
FEMALE LINE CONNECTOR P3



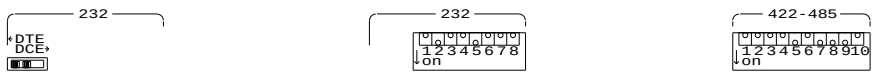
MI400 SERIES

RTS SIGNAL GENERATION BY BRIDGING THE RX (DTE)
CONFIGURATION No 2





FRONT PANEL SETTINGS



RS232 TYPE DTE EQUIPMENT (PC) - TRANSMISSION VALIDATION CONTROL BY RTS
CTS PERMANENTLY ENABLED - CTS DELAY 0 ms - DSR/DCD DISABLED
RS485 MODE - WITHOUT ECHO - WITH LINE BIAS - WITHOUT TERMINATION RESISTOR

FRONT PANEL L.E.D. STATUS

signal " ON "	signal " OFF "	signal " BLINKING "	
POWER , CTS	TX , RX , RTS/DTR , DSR/DCD		IDLE
POWER , CTS	TX , RTS/DTR , DSR/DCD	RX	RECEPTION
POWER , CTS	RX , DSR/DCD	TX , RTS/DTR	TRANSMISSION

USAGE RESTRICTIONS FOR RTS SIGNAL GENERATION BY BRIDGING WITH TXD SIGNAL

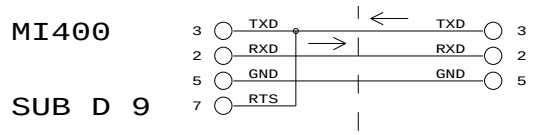
- COMMUNICATION SPEED LIMIT: 56 Kbds/s WITH LINE LENGTH 200 m MAXIMUM
  9,6 Kbds/s WITH LINE LENGTH 1 Km MAXIMUM
- MAXIMUM NUMBER OF RS485 INTERFACES: MAXIMUM 20 IF HETEROGENEOUS NETWORK
  MAXIMUM 116 IF MI400 BASED HOMOGENEOUS NETWORK
- DO NOT USE LINE TERMINATION RESISTORS
- LINE BIAS SUPPLIED BY THE MI400 CONVERTER
- ENVIRONMENT FREE FROM MAJOR INTERFERENCE
- SHIELDED CABLE RECOMMENDED

(TEST FOR IMMUNITY TO RAPID BURST TRANSITIONS ON A LENGTH OF 1 Km,
AT 56 Kbds/s (FOLLOWING NF EN 61000-4-4): > 2,3 KV)

RS232 INTERFACE

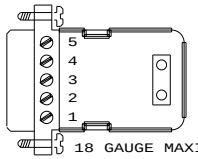
RTS SIGNAL GENERATION BY BRIDGING THE TXD SIGNAL

CONNECTION WITH " DTE " TYPE EQUIPMENT



RS485 INTERFACE

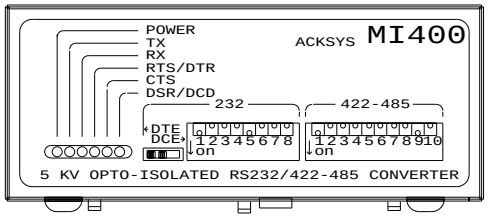
FEMALE LINE CONNECTOR P3

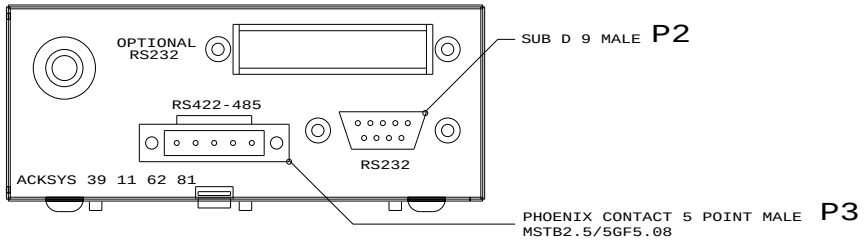


MI400 SERIES

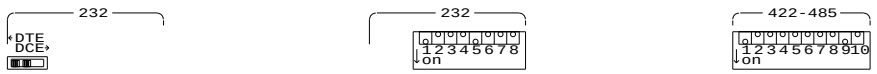
USE IN RS423A MODE

CONFIGURATION No 3





FRONT PANEL SETTINGS



RS232 TYPE DTE EQUIPMENT (PC) - PERMANENT TRANSMISSION VALIDATION

CTS PERMANENTLY ENABLED - CTS DELAY 0 ms - DSR/DCD DISABLED

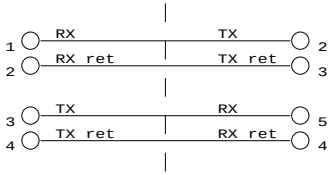
RS422 MODE - WITHOUT BIAS LINE - WITHOUT TERMINATION RESISTOR

RS423A INTERFACAGE

CONNECTION WITH 90L+DECserver

MI400

P3 FEMALE



DECServer 90L

MMJ

FRONT PANEL L.E.D. STATUS

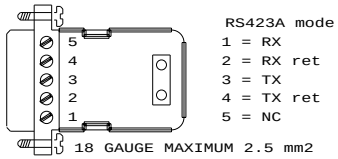
signal " ON "	signal " OFF "	signal " BLINKING "	
POWER , CTS , RTS/DTR	TX , RX , DSR/DCD		IDLE
POWER , CTS , RTS/DTR	TX , DSR/DCD	RX	RECEPTION
POWER , CTS , RTS/DTR	RX , DSR/DCD	TX	TRANSMISSION

USE RESTRICTIONS IN RS423A MODE

- MAXIMUM CABLE LENGTH : 600 m at 1 KBits/s
- MAXIMUM SPEED : 100 KBits/s at 10 m
- DO NOT USE LINE TERMINATION RESISTORS
- USE SHIELDED TWISTED PAIR CABLE

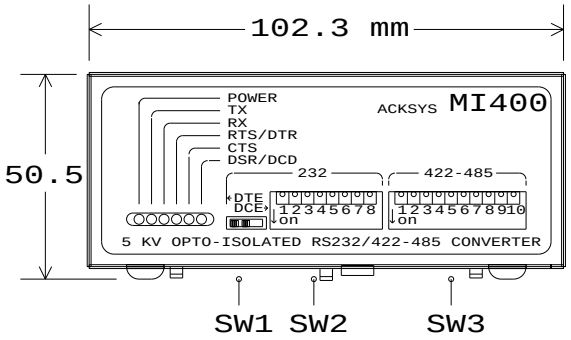
RS423A INTERFACE

FEMALE LINE CONNECTOR P3

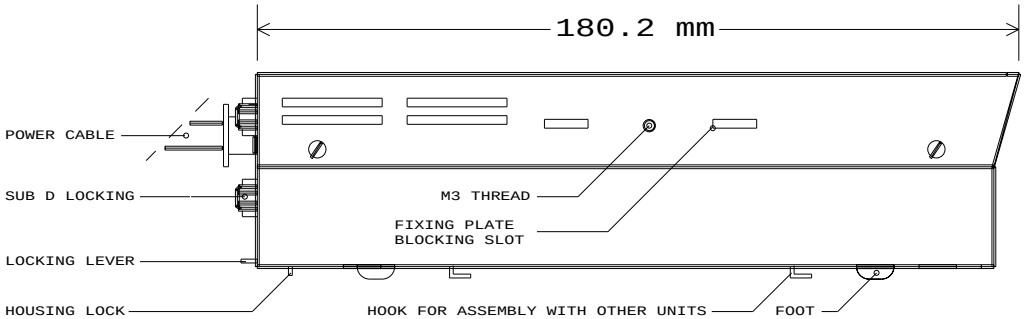


MI400 SERIES

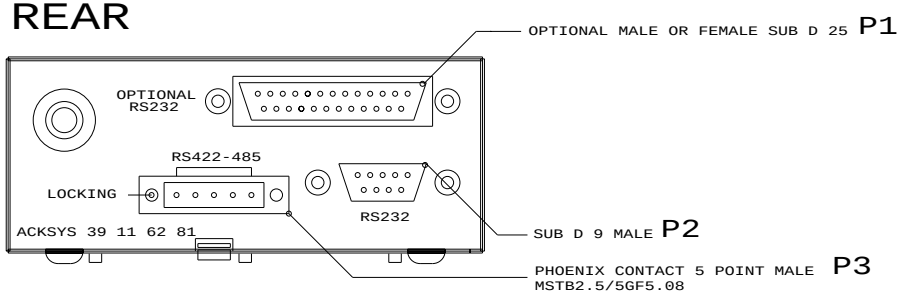
FRONT



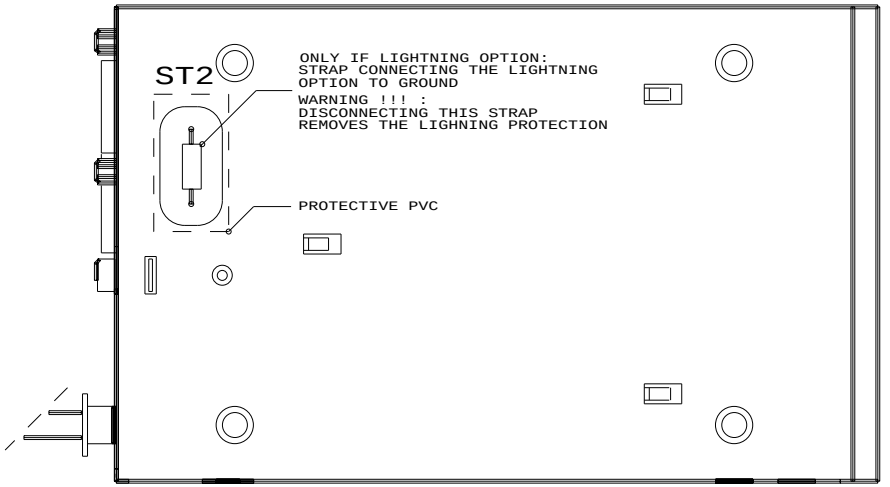
LEFT SIDE



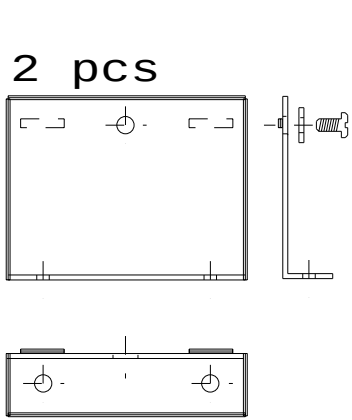
REAR



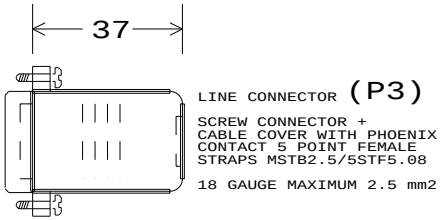
LOWER COVER

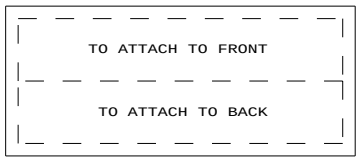


2 pcs



FIXING PLATE KIT FOR VERTICAL
OR HORIZONTAL MOUNTING





2 TRANSPARENT PVC STICKERS
TO PROTECT THE CONFIGURATION

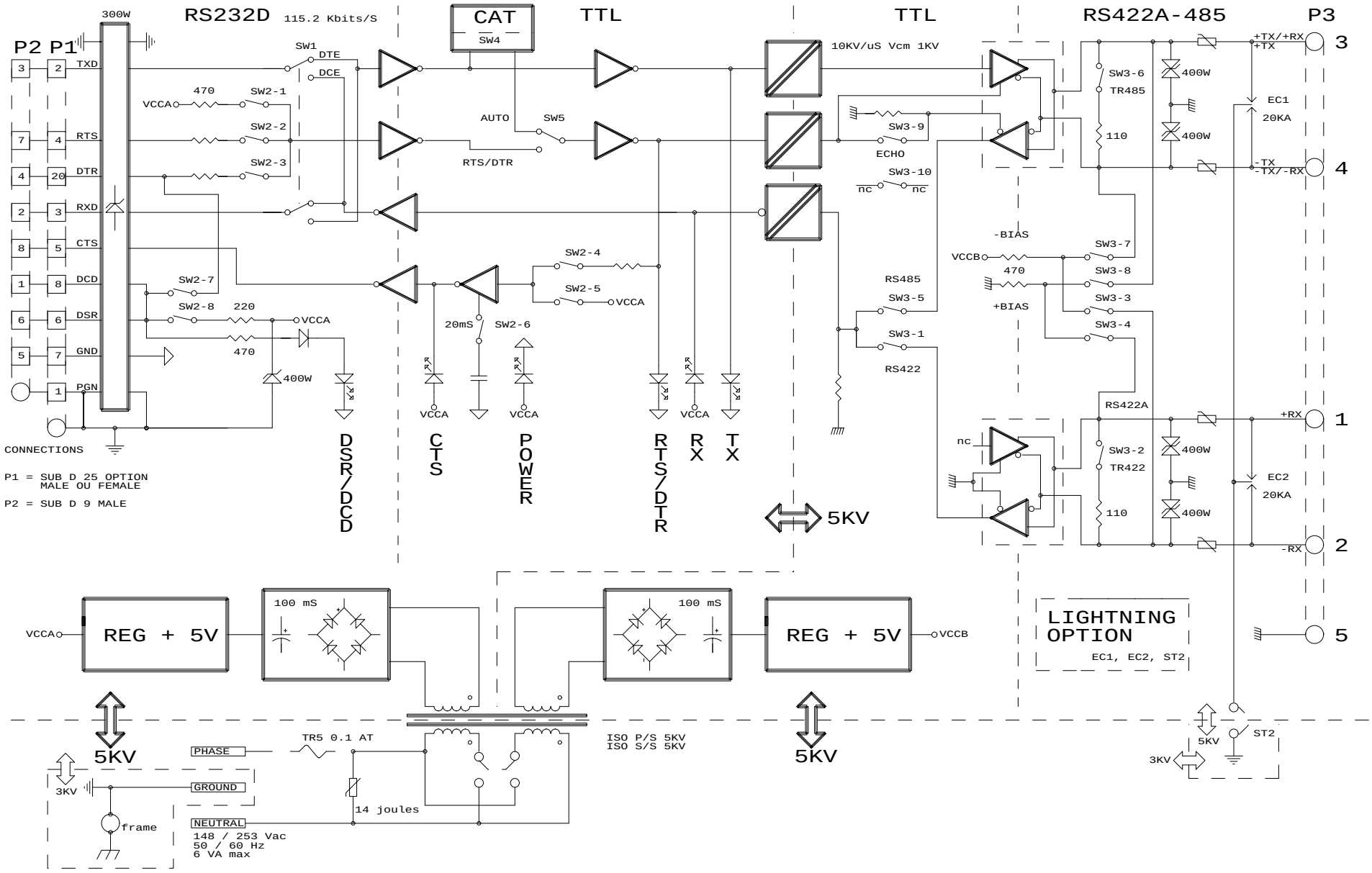
SECTION 3

MI400/RTS Series :

- **MI400/RTS**
- **MI400-24V/RTS**
- **RKMI400 /RTS**

NOTES

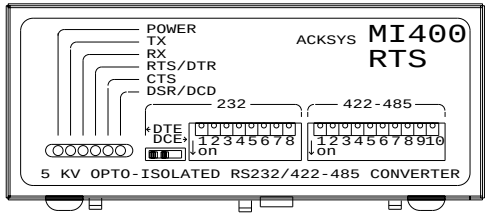
MI400/RTS SERIES



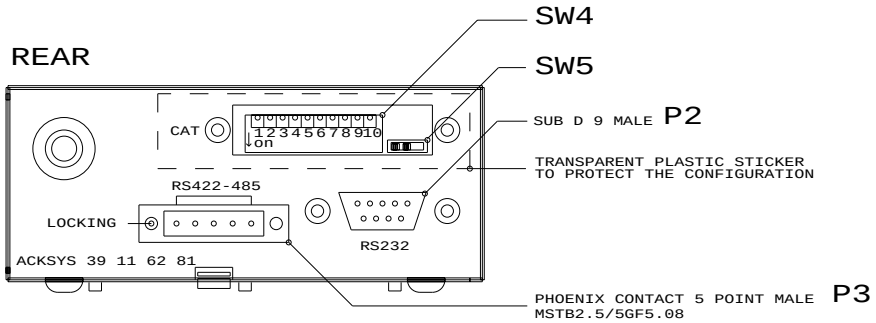
MI400/RTS

CONNECTORS AND SWITCHES

FRONT

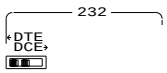


REAR



L.E.D. ON FRONT

signal " ON " signal " OFF "

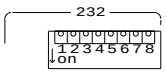


SW1

SW1 = DTE/DCE INTERFACE SELECTION

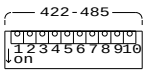
DTE : ex. PC
ex. TERMINAL

DCE : ex. MODEM
ex. MINI



SW2

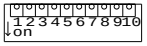
1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL



SW3

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNSUSED

AUTOMATIC TRANSMISSION CONTROL (CAT)



SW4

1 = SPEED SELECTION
2 = SPPED SELECTION
3 = SPEED SELECTION
4 = SPEED SELECTION
5 = SPEED SELECTION
6 = FORMAT SELECTION
7 = FORMAT SELECTION
8 = FORMAT SELECTION
9 = FORMAT SELECTION
10 = FORMAT SELECTION

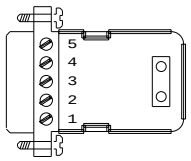
SW5

SW5 = SELECTION OF TRANSMISSION VALIDATION BY RTS/DTR OR AUTOMATICALLY

SEE CONFIGURATION TABLE PAGE 3-5 AND PAGE 3-6

P3

RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND



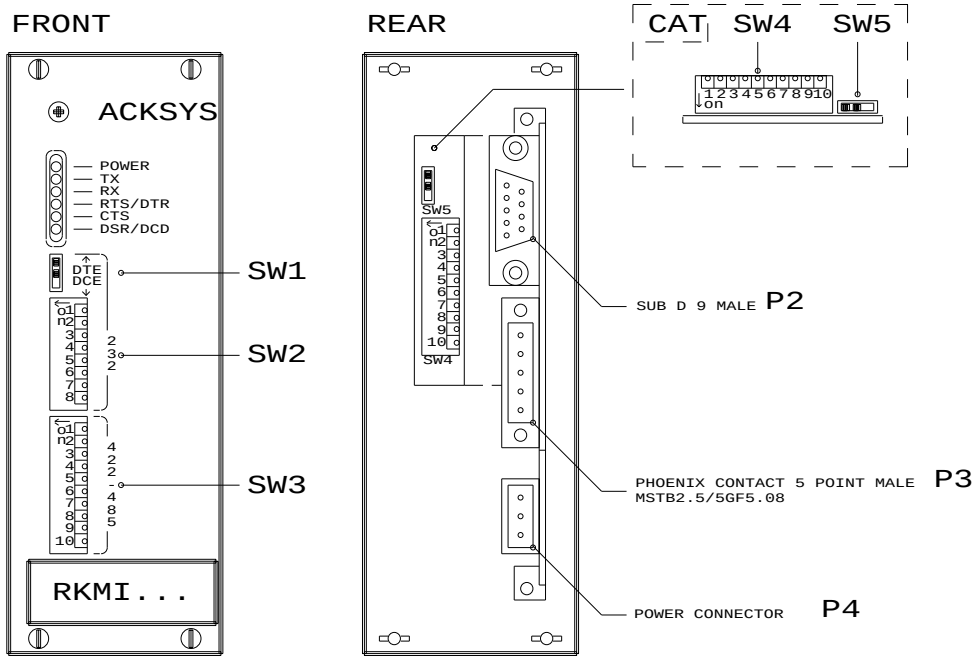
FEMALE LINE CONNECTOR (P3)

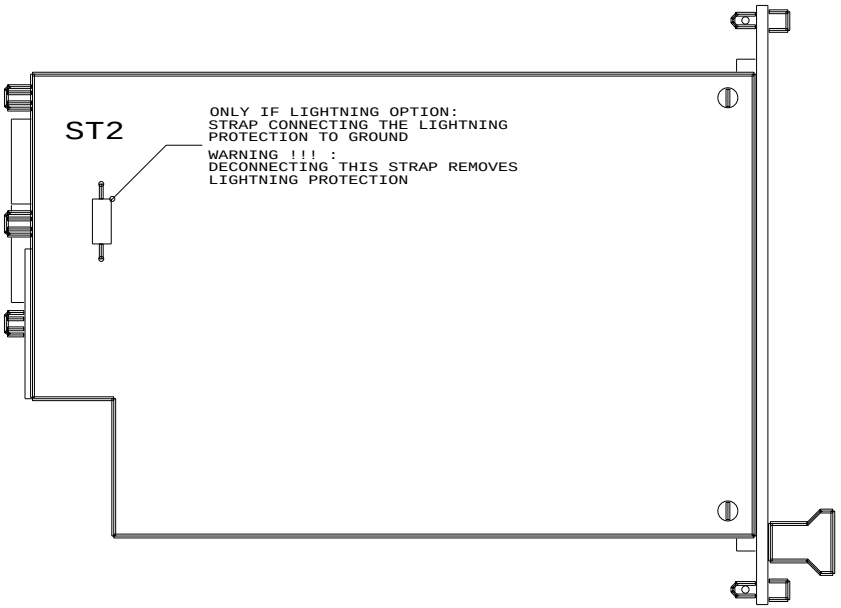
SCREW CONNECTOR +
CABLE COVER WITH PHEONIX
CONTACT 5 POINT FEMALE
STRAPS MSTB2.5/5STF5.08

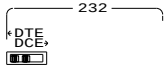
18 GAUGE MAXIMUM 2.5 mm2

RKMI400/RTS

CONNECTORS AND SWITHES

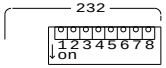






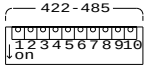
SW1

SW1 = DTE/DCE
INTERFACE SELECTION



SW2

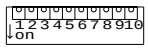
1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL



SW3

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNUSED

AUTOMATIC TRANSMISSION CONTROL (CAT)

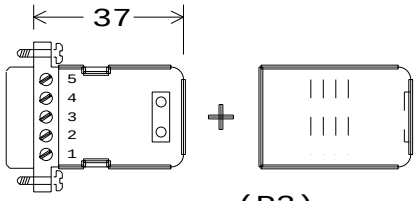


SW4

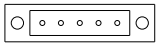
1 = SPEED SELECTION
2 = SPEED SELECTION
3 = SPEED SELECTION
4 = SPEED SELECTION
5 = SPEED SELECTION
6 = FORMAT SELECTION
7 = FORMAT SELECTION
8 = FORMAT SELECTION
9 = FORMAT SELECTION
10 = FORMAT SELECTION

SW5

SW5 = SELECTION OF TRANSMISSION
VALIDATION BY RTS/DTR
OR AUTOMATICALLY



FEMALE LINE CONNECTOR (P3)
SCREW CONNECTOR +
CABLE COVER WITH PHEONIX
CONTACT 5 POINT FEMALE
STRAPS MSTB2.5/5STF5.08
18 GAUGE MAXIMUM 2.5 mm2



P3

RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND

L.E.D. ON FRONT

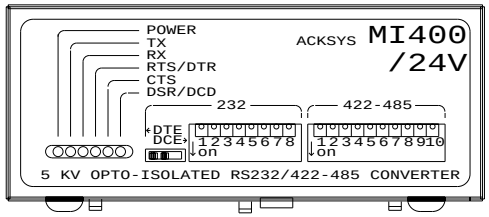
signal " ON "

signal " OFF "

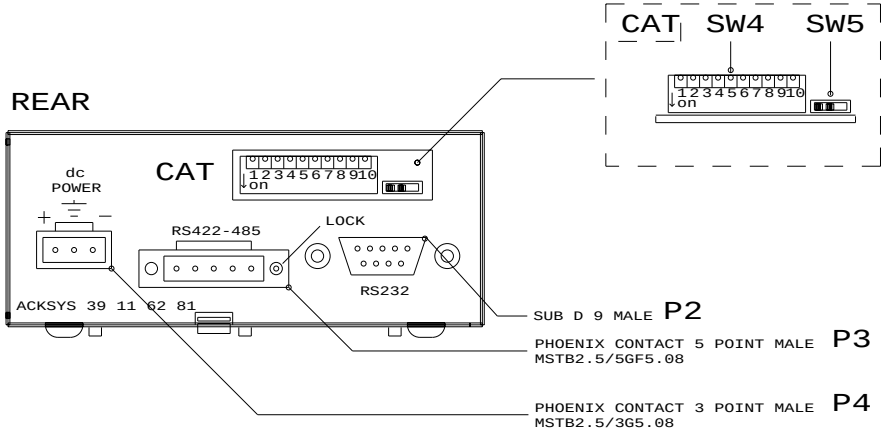
SEE CONFIGURATION TABLE
PAGE 3-5 AND PAGE 3-6

MI400-24V/RTS
CONNECTOR AND SWITCHES

FRONT

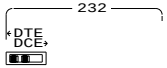


REAR



L.E.D. ON FRONT

signal " ON " signal " OFF "

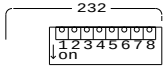


SW1

SW1 = DTE/DCE INTERFACE SELECTION

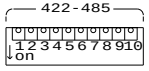
DTE = ex P.C.
ex TERMINAL

DCE = ex MODEM
ex MINI



SW2

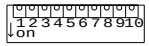
1 = TRANSMISSION VALIDATION
2 = TRANSMISSION VALIDATION
3 = TRANSMISSION VALIDATION
4 = CTS CONTROL
5 = CTS CONTROL
6 = CTS DELAY
7 = DSR/DCD CONTROL
8 = DSR/DCD CONTROL



SW3

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNUSED

AUTOMATIC TRANSMISSION CONTROL (CAT)



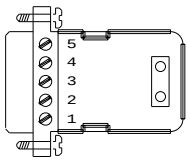
SW4

1 = SPEED SELECTION
2 = SPPED SELECTION
3 = SPEED SELECTION
4 = SPEED SELECTION
5 = SPEED SELECTION
6 = FORMAT SELECTION
7 = FORMAT SELECTION
8 = FORMAT SELECTION
9 = FORMAT SELECTION
10 = FORMAT SELECTION

SW5

SW5 = SELECTION OF TRANSMISSION VALIDATION BY RTS/DTR OR AUTOMATICALLY

SEE CONFIGURATION TABLE PAGE 3-5 AND PAGE 3-6



FEMALE LINE CONNECTOR (P3)

SCREW CONNECTEUR + CABLE COVER WITH PHEONIX CONTACT 5 POINT FEMALE STRAPS MSTB2.5/5STF5.08

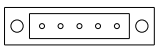
18 GAUGE MAXIMUM 2.5 mm2

FEMALE POWER CONNECTOR (P4)

PHOENIX CONTACT 3 POINT FEMALE MSTB2.5/3ST5.08

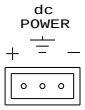
18 GAUGE MAXIMUM 2.5 mm2

ISOLATIONS:	5 KVdc between RS232 and RS422A/485
	2,5 KVdc between RS232 and +- 24Vdc
	2,5 KVdc between RS422/485 and +- 24Vdc



P3

RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND



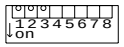
P4

20 Vdc to 30 Vdc
150 mA Max

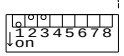
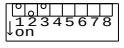
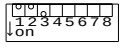
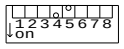
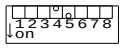
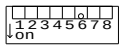
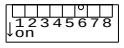
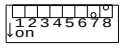
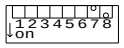
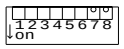
MI400/RTS SERIES
SW1, SW2, SW3 SWITCH SETTINGS

IN AUTOMATIC TRANSMISSION CONTROL POSITION, THESE SETTINGS ARE NOT VALID.

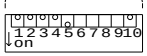
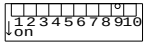
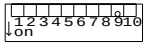
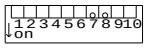
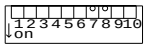
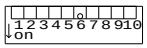
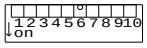
POSITION SW2 AS FOLLOWS:



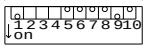
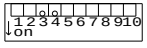
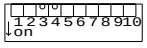
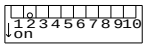
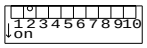
RS232

SW2	
	PERMANENT TRANSMISSION VALIDATION
	TRANSMISSION VALIDATION CONTROL BY RTS
	TRANSMISSION VALIDATION CONTROL BY DTR
	CTS CONTROL BY RTS/DTR/AUTO
	CTS PERMANENTLY ENABLED
	CTS DELAY 20 mS
	CTS DELAY 0 mS
	DSR/DCD CONTROL BY DTR
	DSR/DCD PERMANENTLY ENABLED
	DSR/DCD DISABLED

RS485

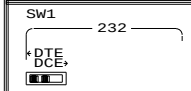
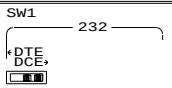
SW3	
	RS485 MODE
	WITH ECHO
	WITHOUT ECHO
	WITH LINE BIAS
	WITHOUT LINE BIAS
	WITH TERMINATION RESISTOR
	WITHOUT TERMINATION RESISTOR

RS422A

SW3	
	RS422A MODE
	WITH LINE BIAS
	WITHOUT LINE BIAS
	WITH TERMINATION RESISTOR
	WITHOUT TERMINATION RESISTOR

RS232

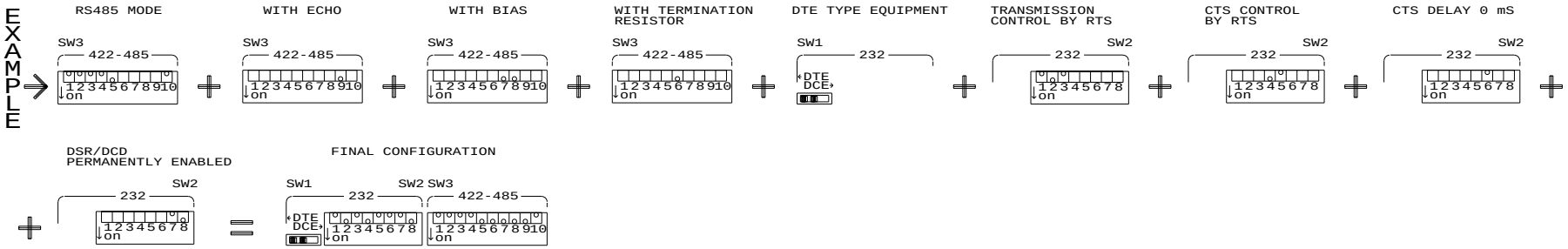
SELECTION OF TYPE OF EQUIPMENT WITH WICH TO INTERFACE (DTE or DCE)

SW1	
	DTE
	DCE

DTE = P.C. , TERMINAL ...

DCE = MODEM , MINI ...

EXAMPLE

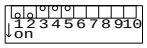
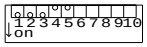
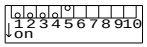
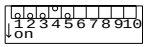
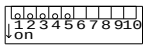
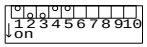
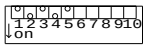
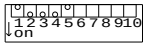
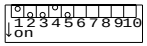
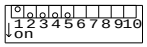
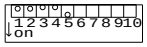
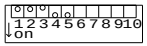


MI400/RTS SERIES

SW4 & SW5 SWITCH SETTINGS TO AUTOMATICALLY VALIDATE TRANSMISION

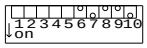
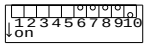
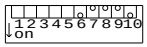
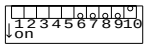
SPEED

SW4

	150 bps
	300 bps
	600 bps
	1200 bps
	2400 bps
	4800 bps
	7200 bps
	9600 bps
	19.2 Kbps
	38.4 Kbps
	57.6 Kbps
	115.2 Kbps

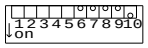
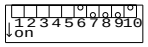
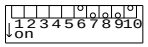
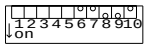
5 bits FORMAT

SW4

	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	1.5 STOP WITHOUT PARITY
	1.5 STOP WITH PARITY

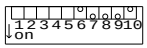
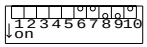
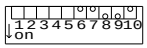
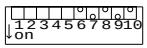
FORMAT 6 bits

SW4

	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

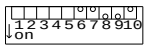
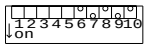
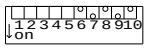
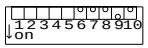
FORMAT 7 bits

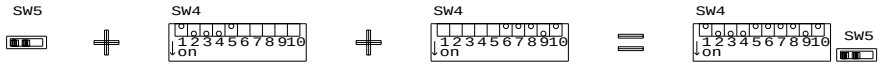
SW4

	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

FORMAT 8 bits

SW4

	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

EXAMPLE → 

AUTOMATIC VALIDATION | 9600 bps | 8 bits 2 STOP WITH PARITY | FINAL CONFIGURATION

SW5 TRANSMISSION VALIDATION SELECTION

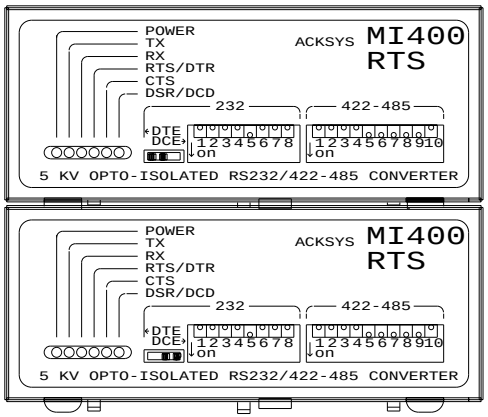
 AUTOMATIC	 BY RTS/DTR OR PERMANENT
OBLIGATORY POSITION FOR VALIDATING THE SW4 CONFIGURATION	USE THIS POSITION TO VALIDATE THE FIRST 3 CONFIGURATION OF SW2

MI400/RTS (REV. B or >)

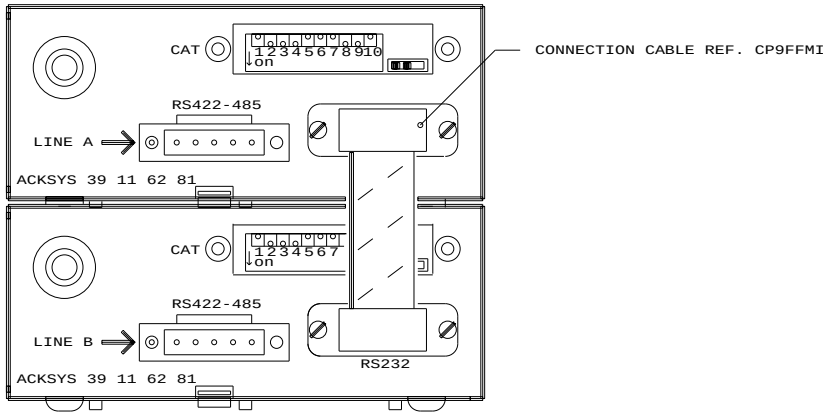
ASSEMBLING 2 UNITS FOR USE AS RS485 REPEATER

SWITCH SETTINGS

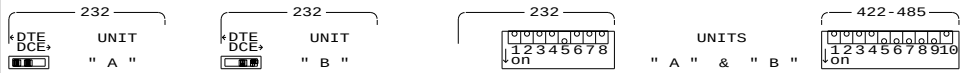
FRONT



REAR

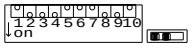


FRONT PANEL SETTINGS



RS485 MODE - WITH LINE POLARISATION - WITH TERMINATION RESISTOR
ONLY ONE BIAS PER LINE IS NECESSARY

REAR SETTINGS



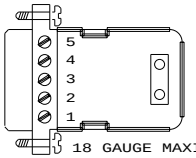
9600 bps - 8 bits - 1 STOP - WITHOUT PARITY - AUTOMATIC VALIDATION
SEE SW4 & SW5 SETTINGS FOR OTHER SPEEDS AND FORMATS

L.E.D. STATUS ON FRONT

signal " ON "	signal " OFF "	signal " BLINKING "	
POWER , CTS	TX , RX , RTS/DTR , DSR/DCD		IDLE
POWER , CTS	TX , RTS/DTR , DSR/DCD	RX	RECEPTION
POWER , CTS	RX , DSR/DCD	TX , RTS/DTR	TRANSMISSION

RS485 INTERFACE

FEMALE LINE CONNECTOR P3



RS485 mode
1 = NC
2 = NC
3 = +TX/+RX
4 = -TX/-RX
5 = NC

18 GAUGE MAXIMUM 2.5 mm2

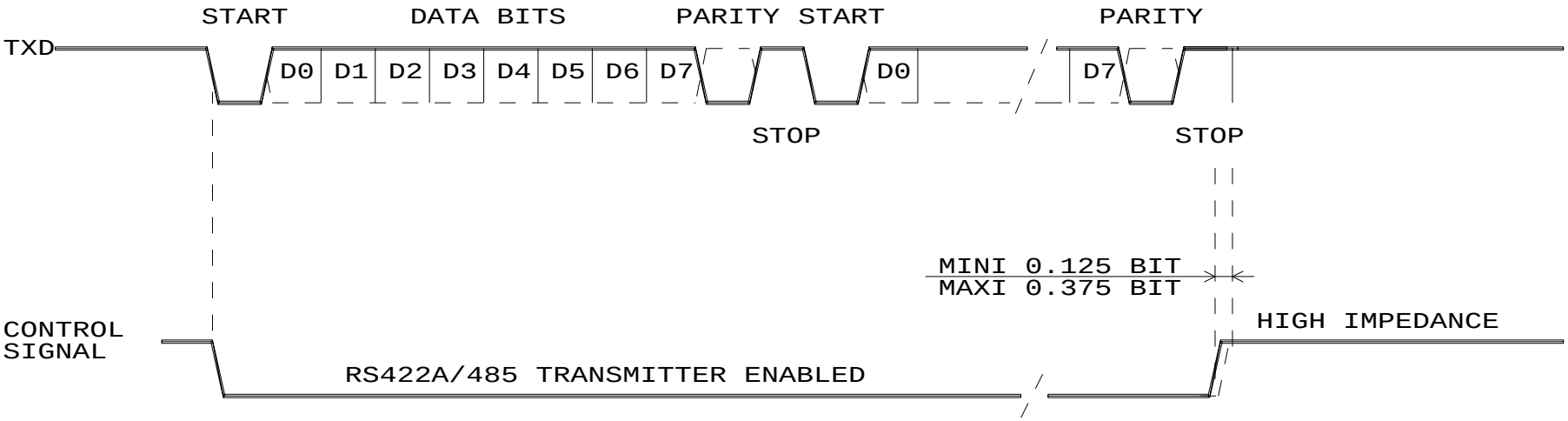
MI400/RTS SERIES (REV. B or >)

TRANSMISSION TIMING DIAGRAM IN RS232D/RS422A-485
AUTOMATIC INTERFACE MODE

FULL-DUPLEX OR HALF-DUPLEX

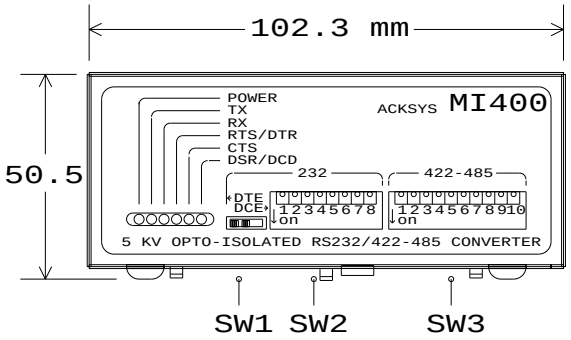
TRANSMISSION VALIDATION CONTROLED AUTOMATICALLY

EXAMPLE WITH FORMAT = 8 bits , 1 STOP , WITH PARITY

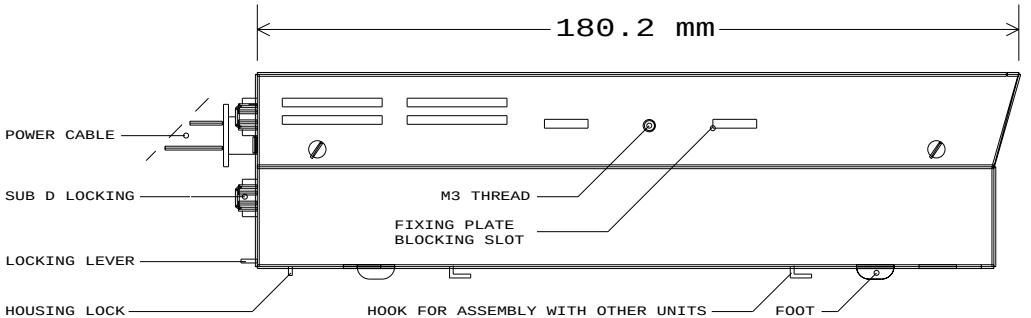


MI400/RTS SERIES

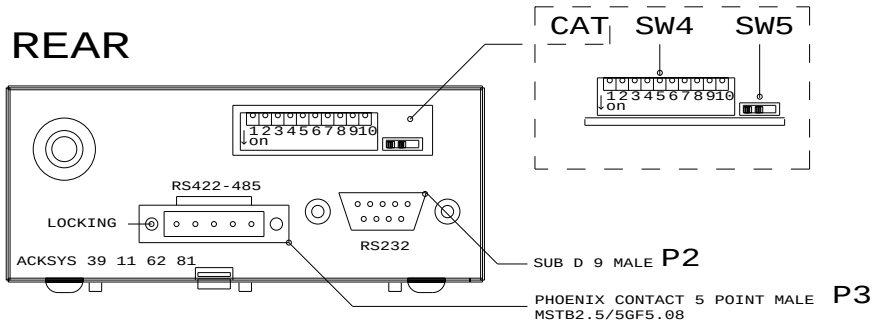
FRONT



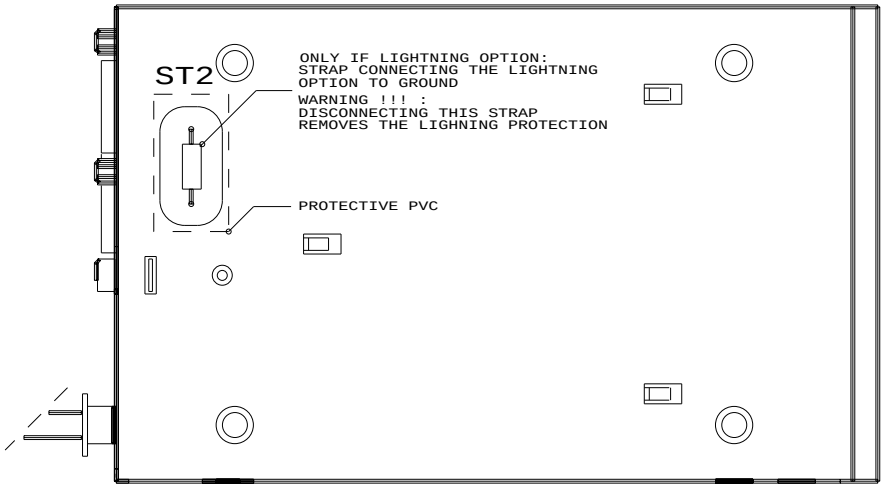
LEFT SIDE



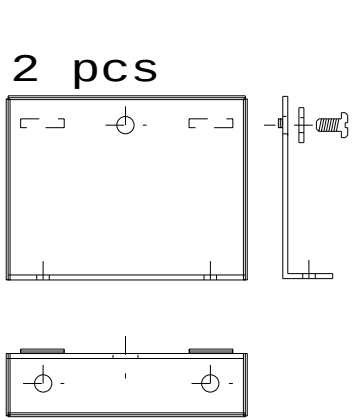
REAR



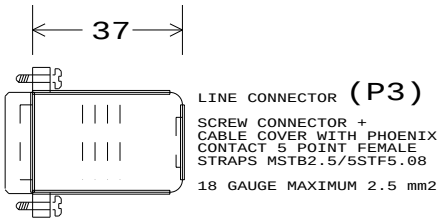
LOWER COVER

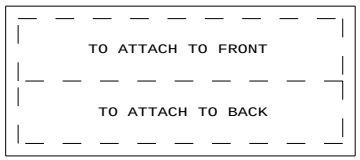


2 pcs



FIXING PLATE KIT FOR VERTICAL
OR HORIZONTAL MOUNTING





2 TRANSPARENT PVC STICKERS
TO PROTECT THE CONFIGURATION

NOTES

SECTION 4

MI400-400 Series :

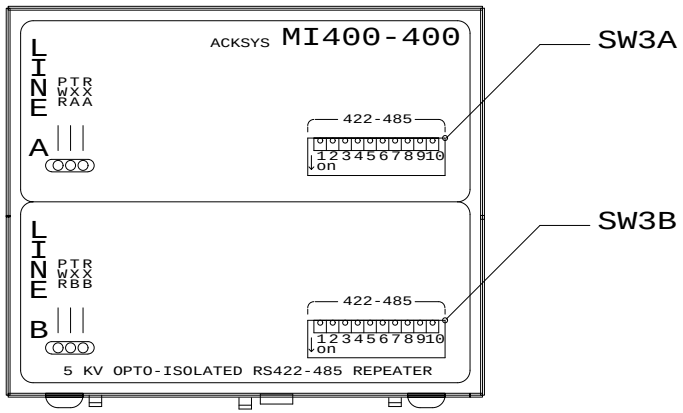
- **MI400-400**

NOTES

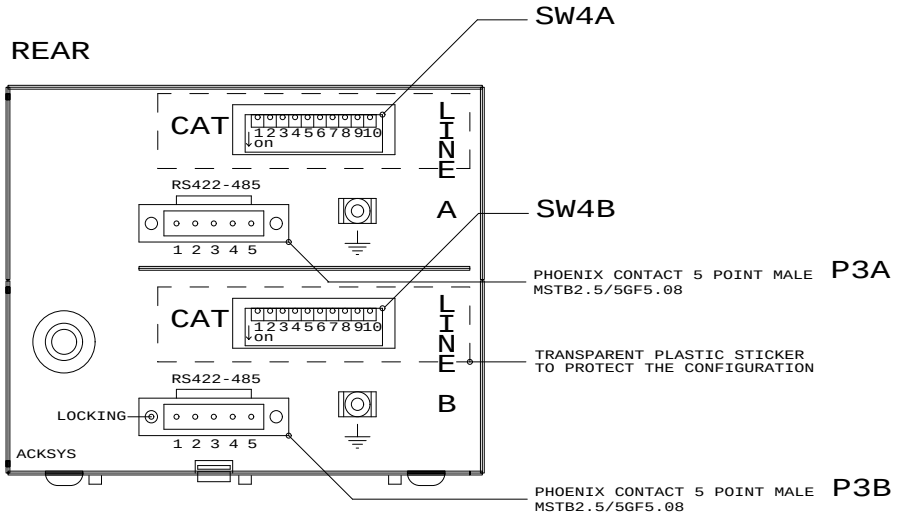
MI400-400

CONNECTORS AND SWITCHES

FRONT

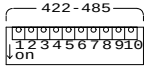


REAR



L.E.D. ON FRONT

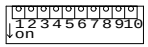
signal " ON " signal " OFF "



SW3A and SW3B

1 = RS422A MODE
2 = RS422A TERMINATION RESISTOR
3 = RS422A -BIAS
4 = RS422A +BIAS
5 = RS485 MODE
6 = RS485 TERMINATION RESISTOR
7 = RS485 -BIAS
8 = RS485 +BIAS
9 = RS485 ECHO
10 = UNUSED

AUTOMATIC TRANSMISSION CONTROL (CAT)

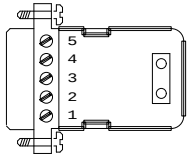


SW4A and SW4B

1 = SPEED SELECTION
2 = SPPED SELECTION
3 = SPEED SELECTION
4 = SPEED SELECTION
5 = SPEED SELECTION
6 = FORMAT SELECTION
7 = FORMAT SELECTION
8 = FORMAT SELECTION
9 = FORMAT SELECTION
10 = FORMAT SELECTION

P3A and P3B

RS422A mode	RS485 mode
1 = +RX	1 = NC
2 = -RX	2 = NC
3 = +TX	3 = +TX/+RX
4 = -TX	4 = -TX/-RX
5 = GND	5 = GND



FEMALE LINE CONNECTOR (P3...)

SCREW CONNECTOR +
CABLE COVER WITH PHEONIX
CONTACT 5 POINT FEMALE
STRAPS MSTB2.5/5STF5.08

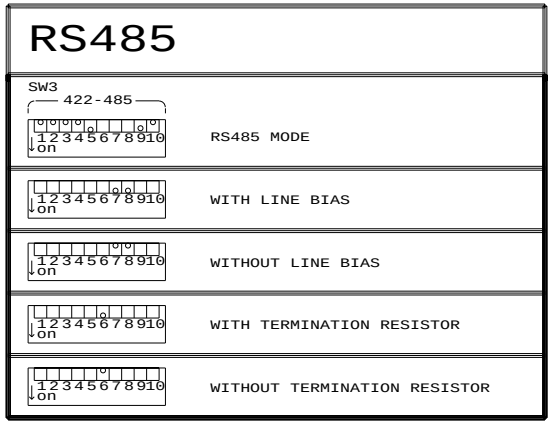
18 GAUGE MAXIMUM 2.5 mm2

SEE CONFIGURATION TABLE PAGE 4-2 AND PAGE 4-3

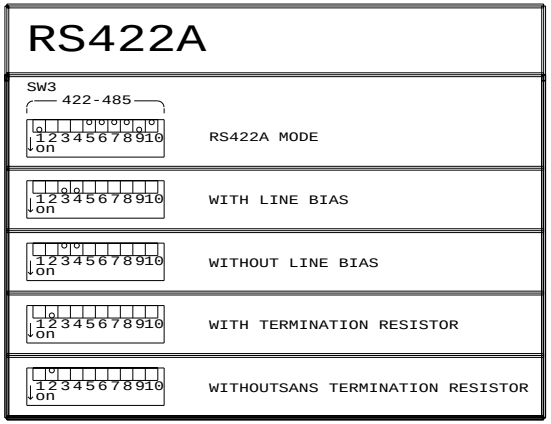
MI400-400 SERIES

SW3A and SW3B SWITCH SETTINGS

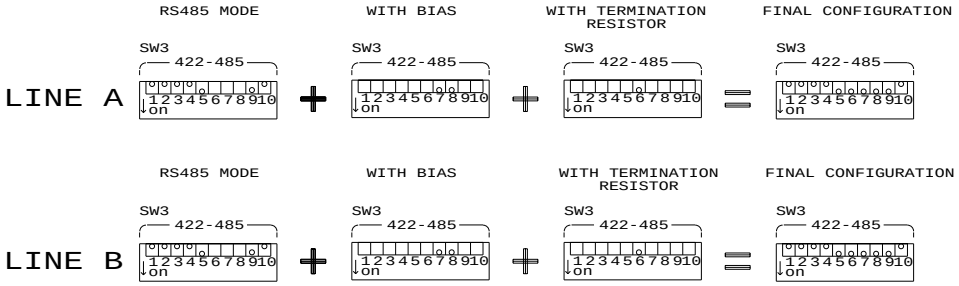
RS485



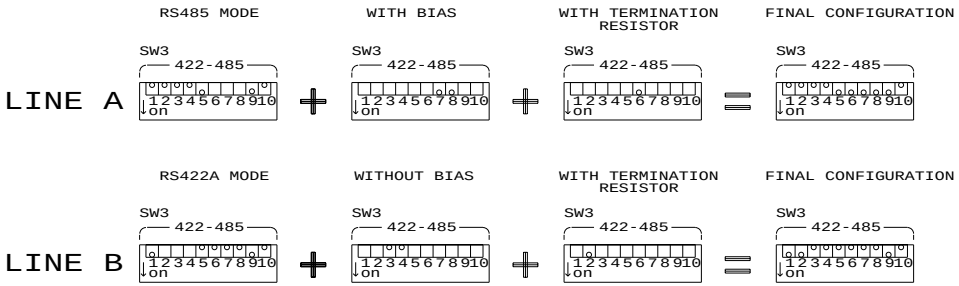
RS422A



EXAMPLE 1: RS485 REPEATER

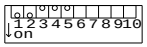
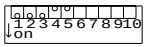
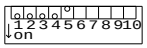
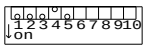
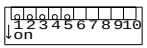
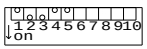
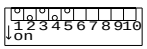
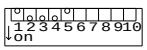
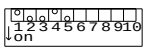
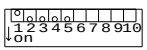
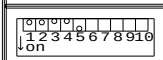
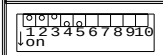


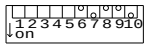
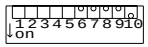
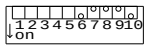
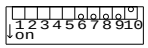
EXAMPLE 2: RS422A / RS485 CONVERTER

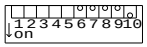
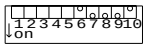
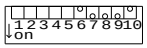
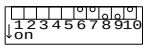


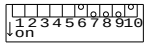
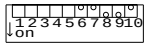
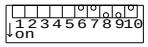
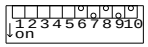
MI400-400 SERIES

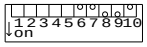
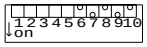
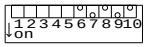
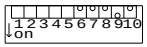
SW4A et SW4B SWITCH SETTINGS

SPEED	
SW4 	150 bps
	300 bps
	600 bps
	1200 bps
	2400 bps
	4800 bps
	7200 bps
	9600 bps
	19.2 Kbps
	38.4 Kbps
	57.6 Kbps
	115.2 Kbps

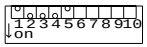
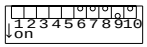
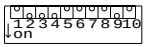
5 bits FORMAT	
SW4 	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	1.5 STOP WITHOUT PARITY
	1.5 STOP WITH PARITY

FORMAT 6 bits	
SW4 	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

FORMAT 7 bits	
SW4 	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

FORMAT 8 bits	
SW4 	1 STOP WITHOUT PARITY
	1 STOP WITH PARITY
	2 STOP WITHOUT PARITY
	2 STOP WITH PARITY

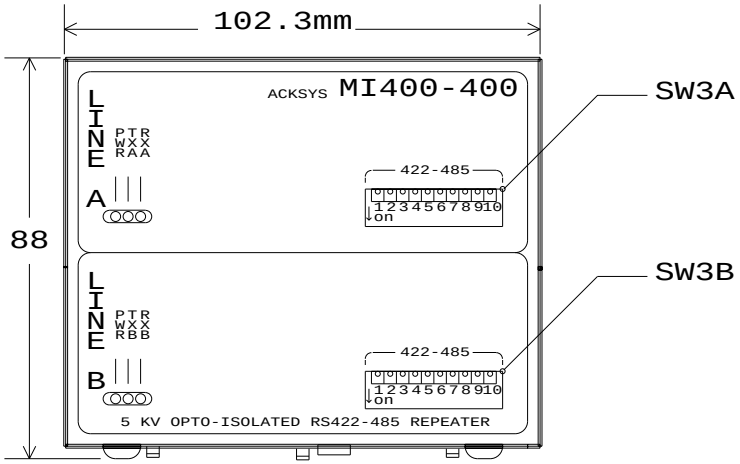
EXAMPLE:

SW4  + SW4  = SW4 

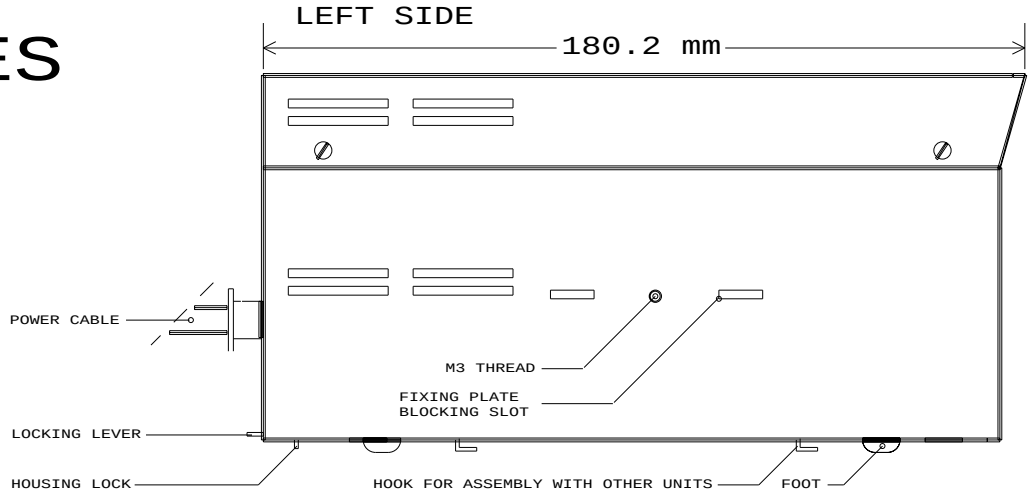
9600 bps | 8 bits 2 STOP WITH PARITY | FINAL CONFIGURATION

MI400-400 SERIES

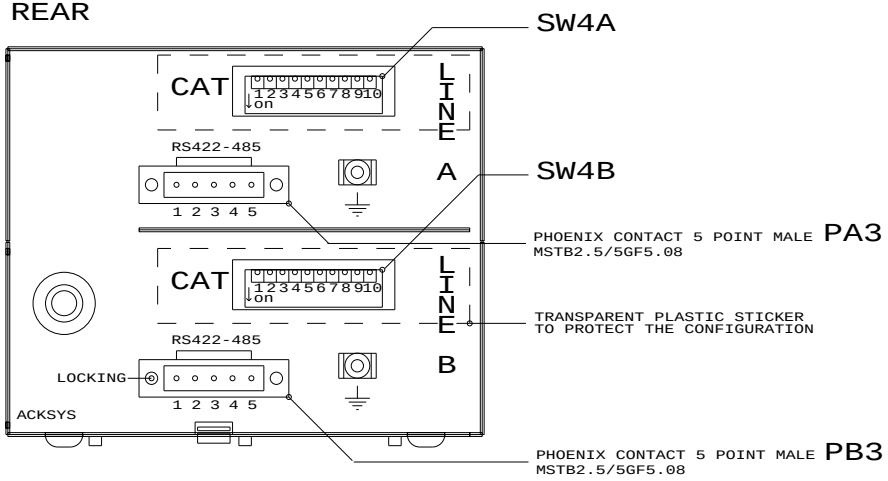
FRONT



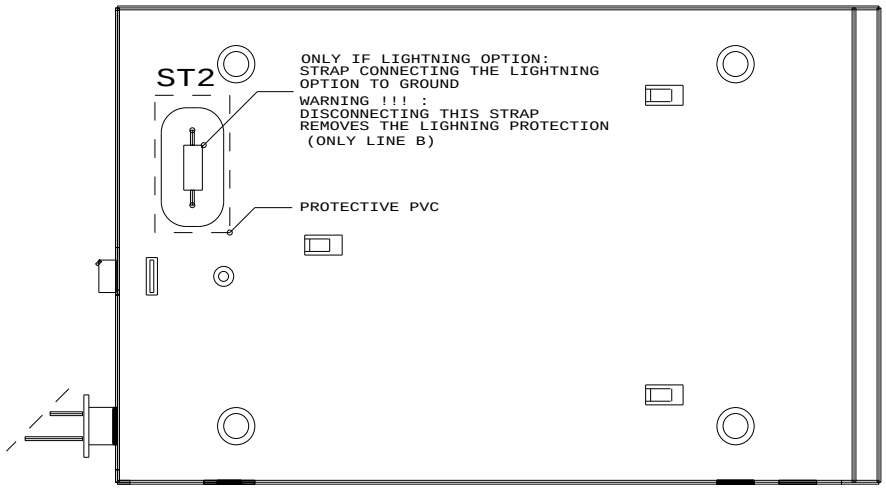
LEFT SIDE

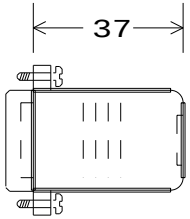


REAR



LOWER COVER

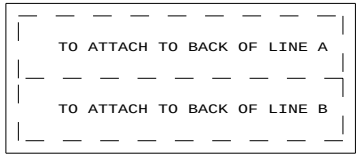




LINE CONNECTOR (P3)

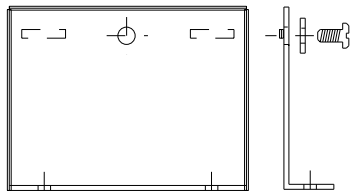
SCREW CONNECTOR + CABLE COVER WITH PHOENIX CONTACT 5 POINT FEMALE STRAPS MSTB2.5/5STF5.08

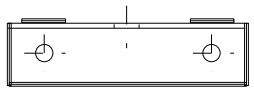
18 GAUGE MAXIMUM 2.5 mm2



2 TRANSPARENT PVC STICKERS
TO PROTECT THE CONFIGURATION

2 Pcs





FIXING PLATE KIT FOR VERTICAL OR HORIZONTAL MOUNTING

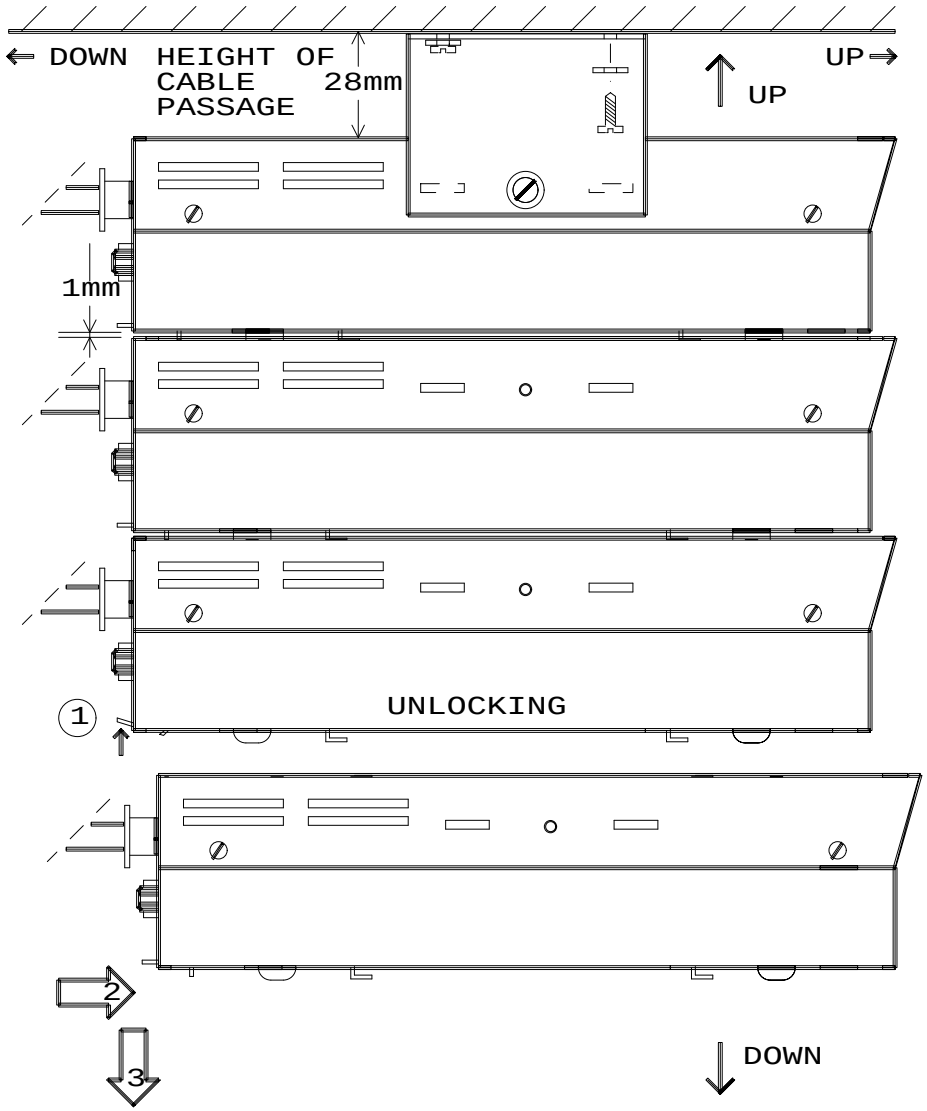
SECTION 5

Assembly Examples With :

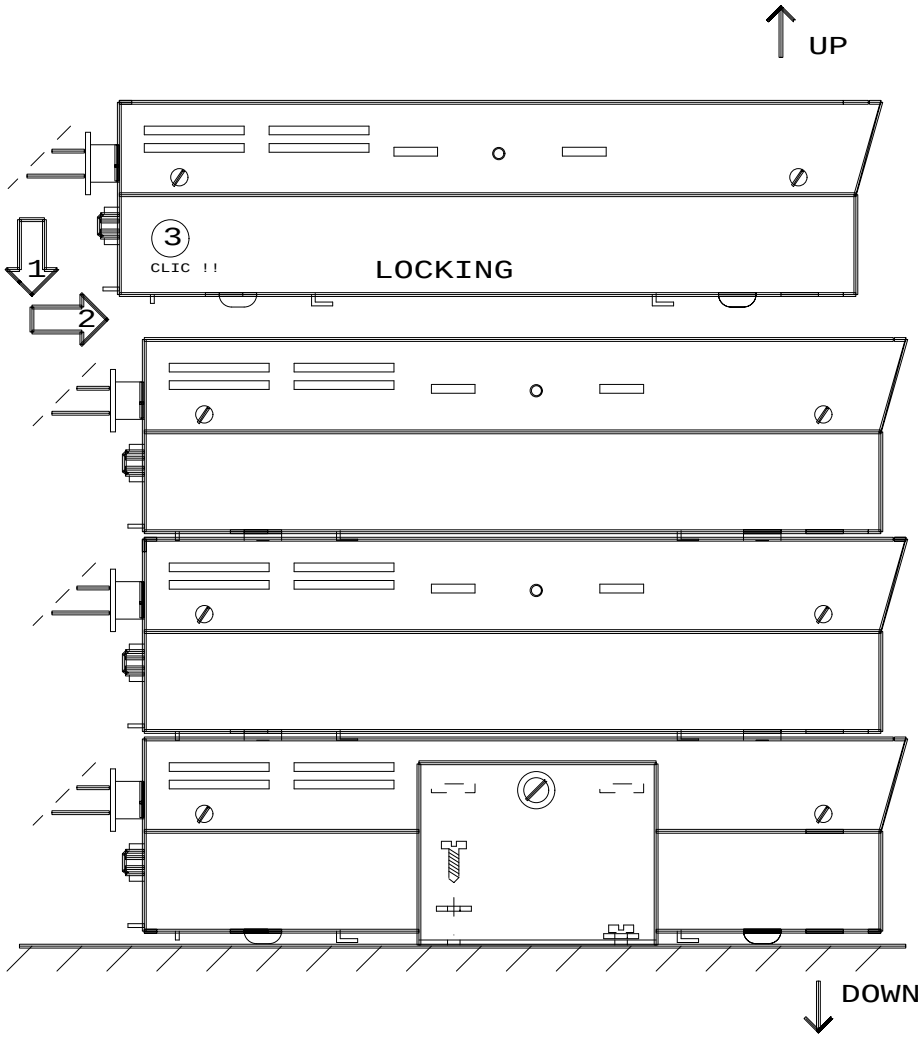
- **FIXING PLATE**
- **RDMI**
- **RKMI**

NOTES

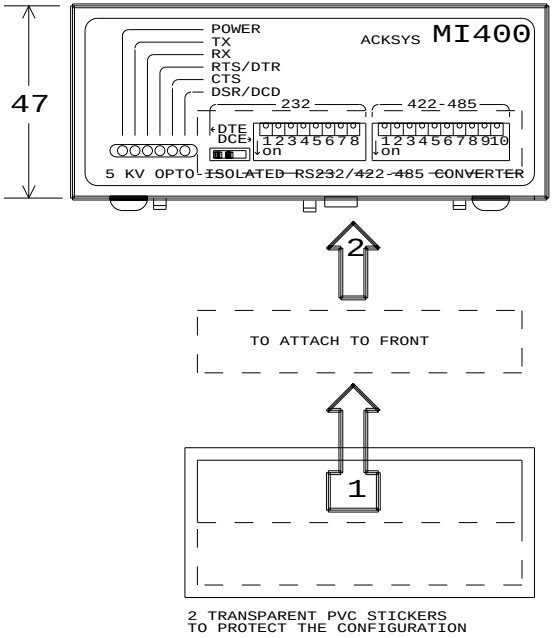
POSITIONING THE FIXING PLATE FOR VERTICAL
OR HONRIZONTAL ASSEMBLY

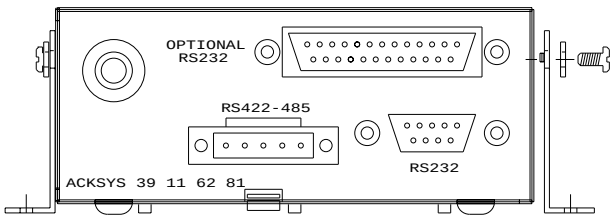


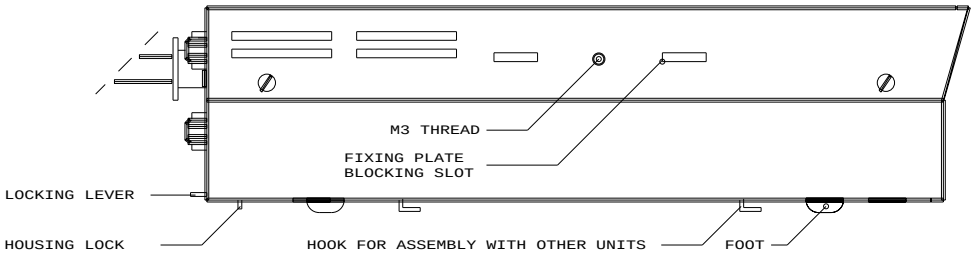
POSITIONING THE FIXING PLATE
FOR HORIZONTAL MOUNTING



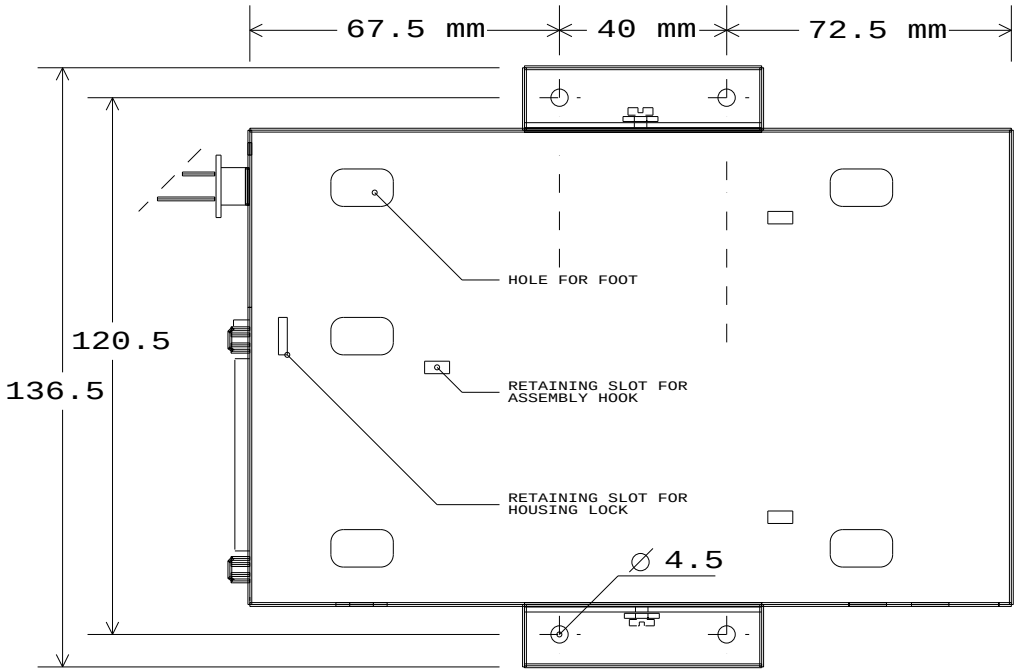
EXAMPLE OF MI400 ASSEMBLY'S WITH THE FIXING PLATE



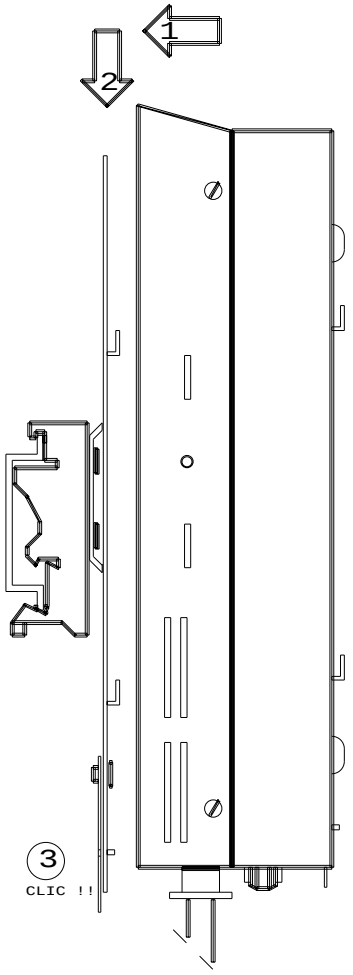




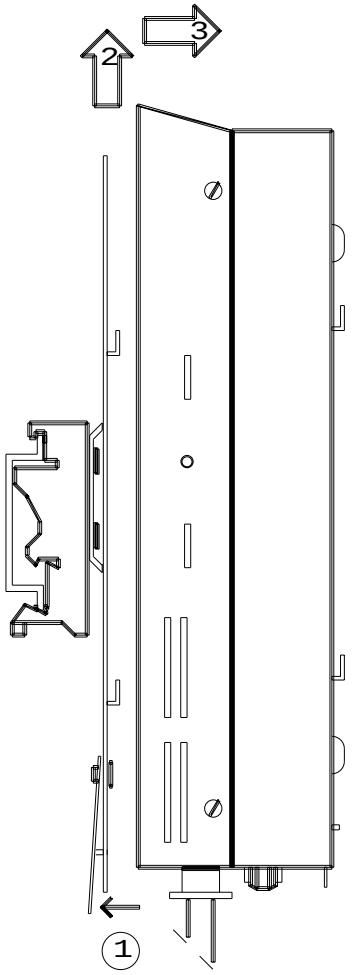
UPPER COVER



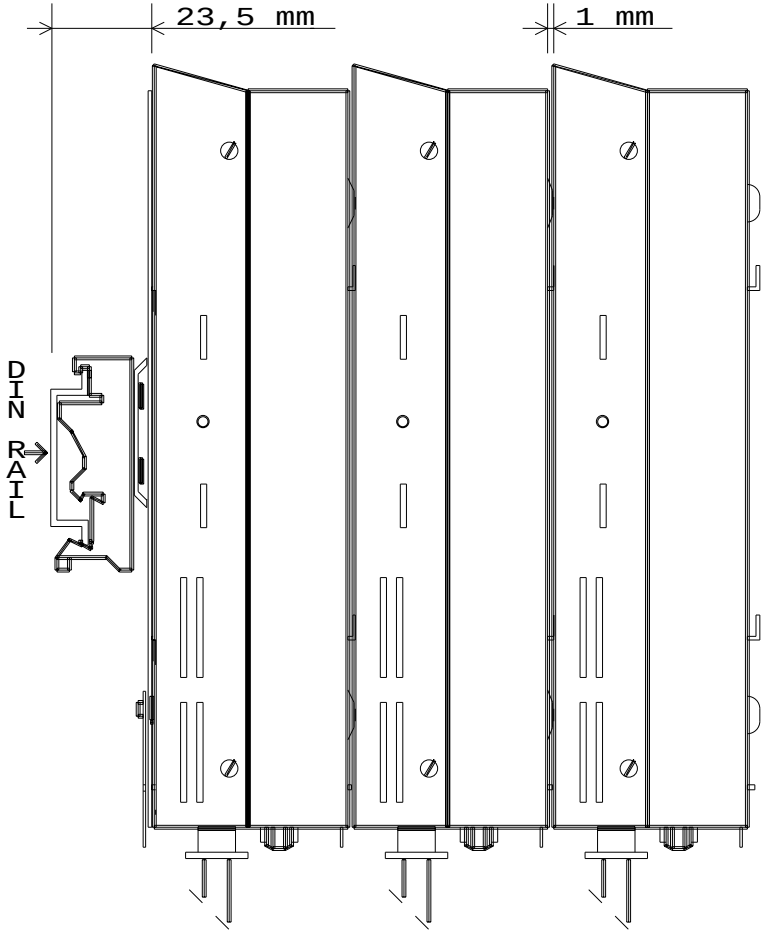
RDMI SUPPORT PLATE FOR DIN RAIL



LOCK

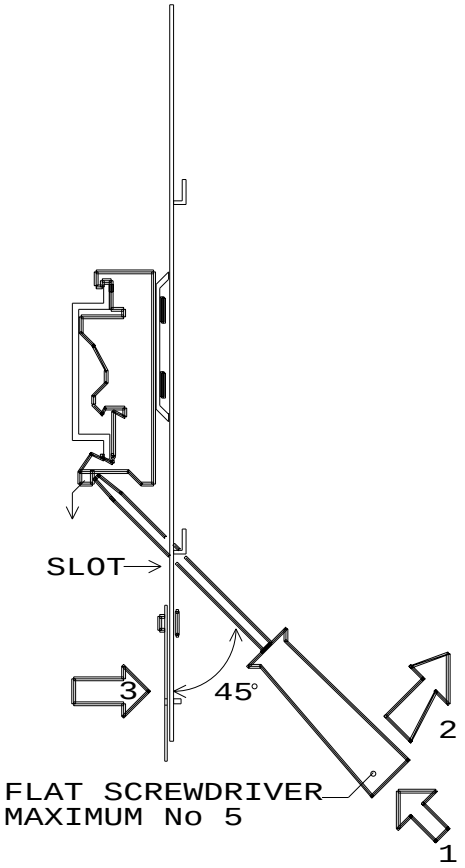


UNLOCK



MAXIMUM 3 UNITS

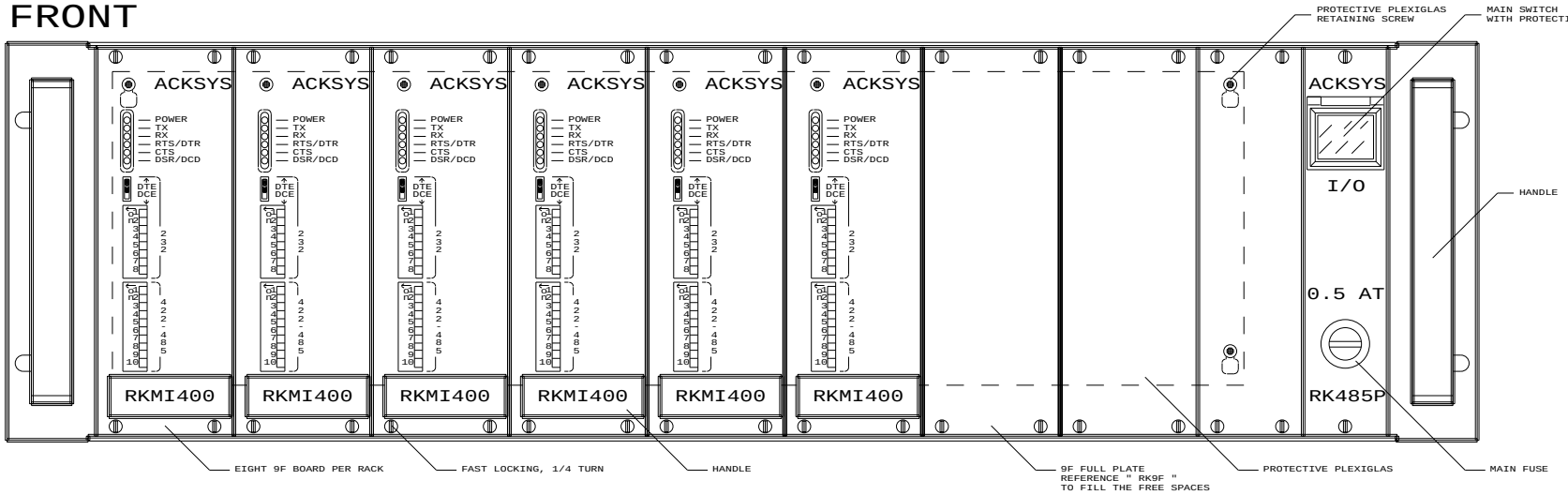
MAXIMUN 1 UNIT
FOR MI400-400



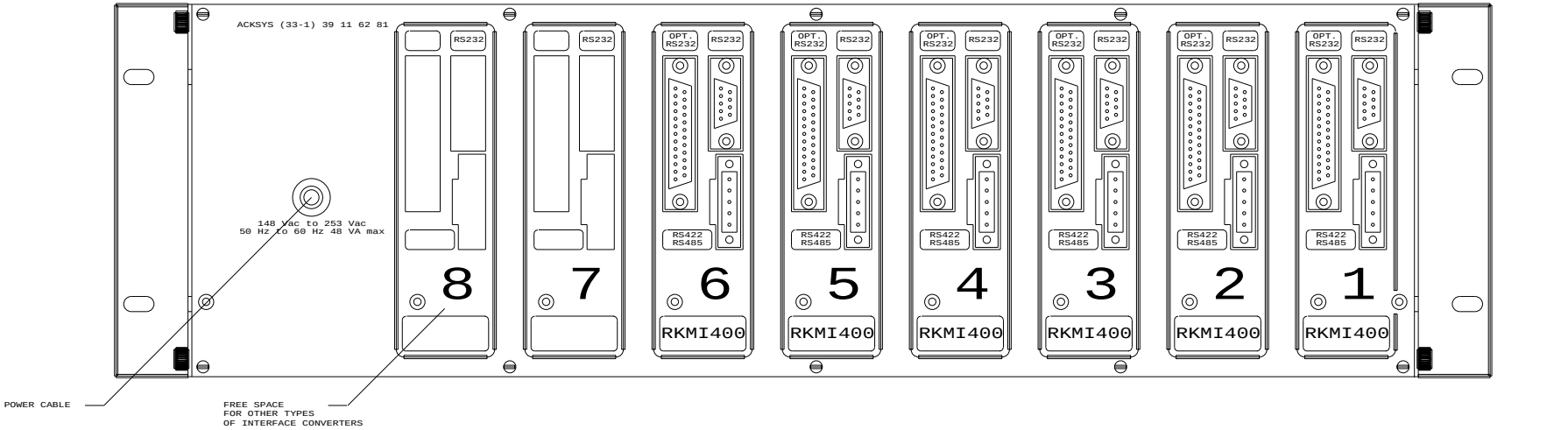
UNLOCKING THE RDMI
SUPPORT PLATE

DESCRIPTION OF 19 " RKMI RACK

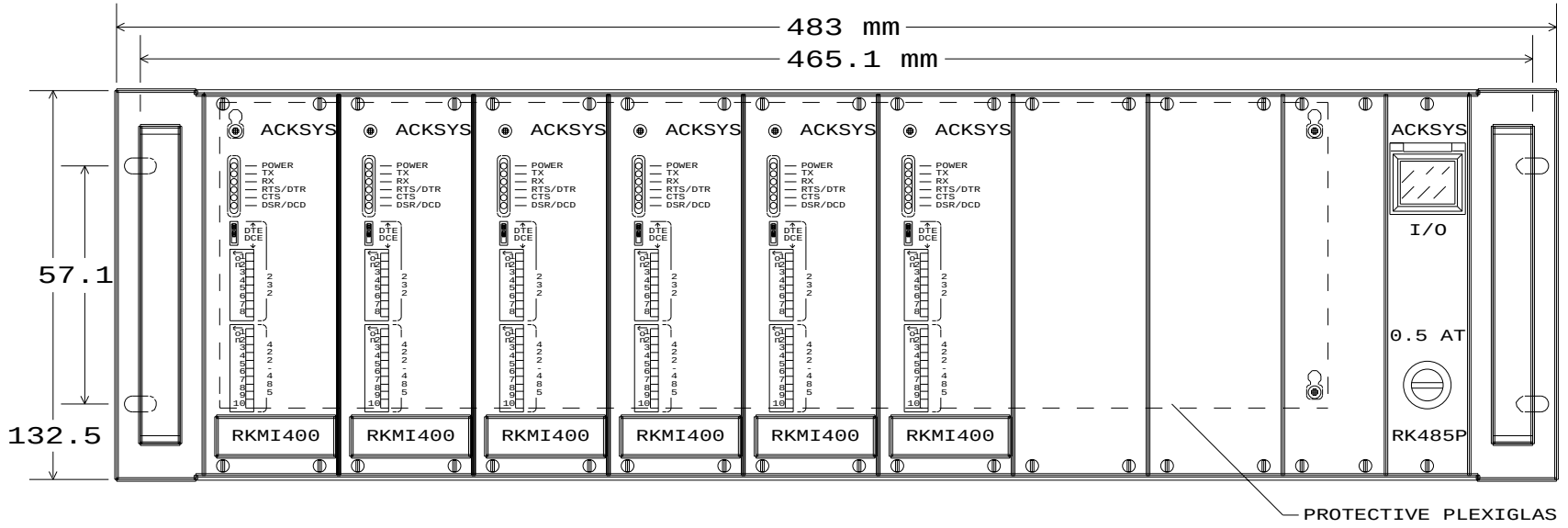
FRONT

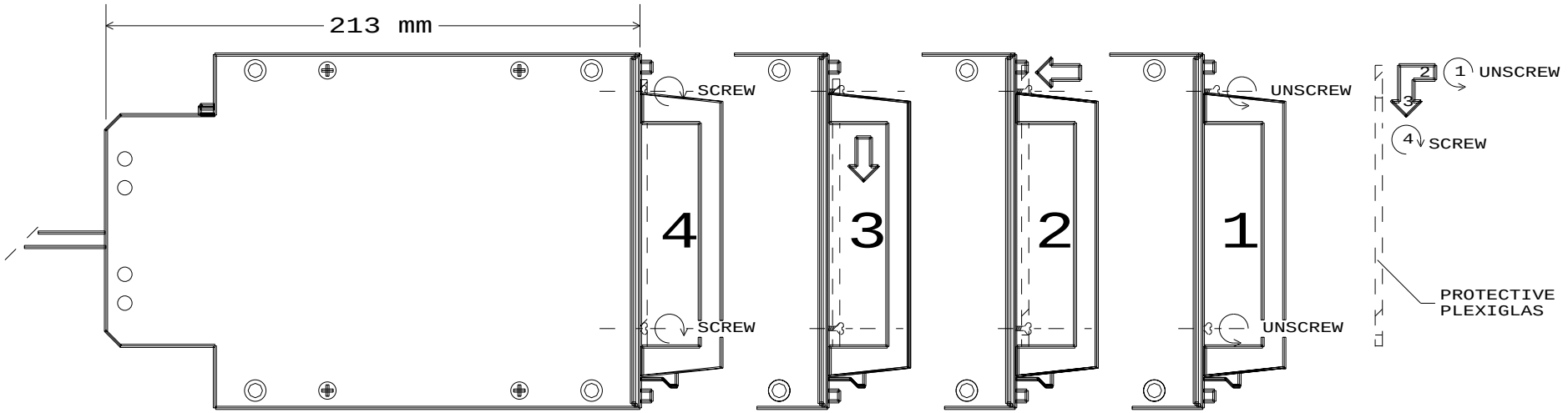


BACK



POSITION IN 19" RKMI RACK & ASSEMBLY OF PROTECTIVE PLEXIGLAS





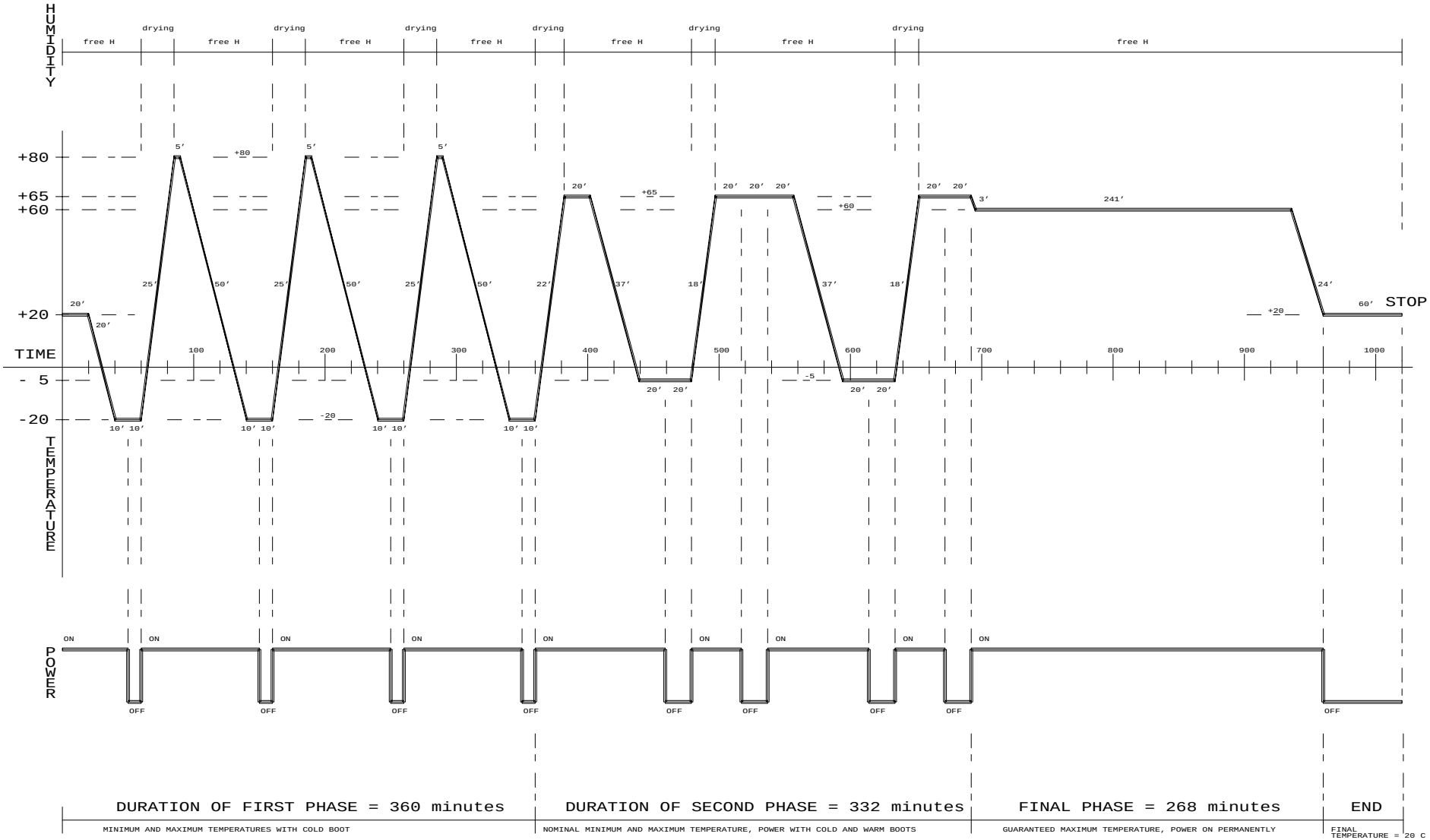
NOTES

SECTION 6

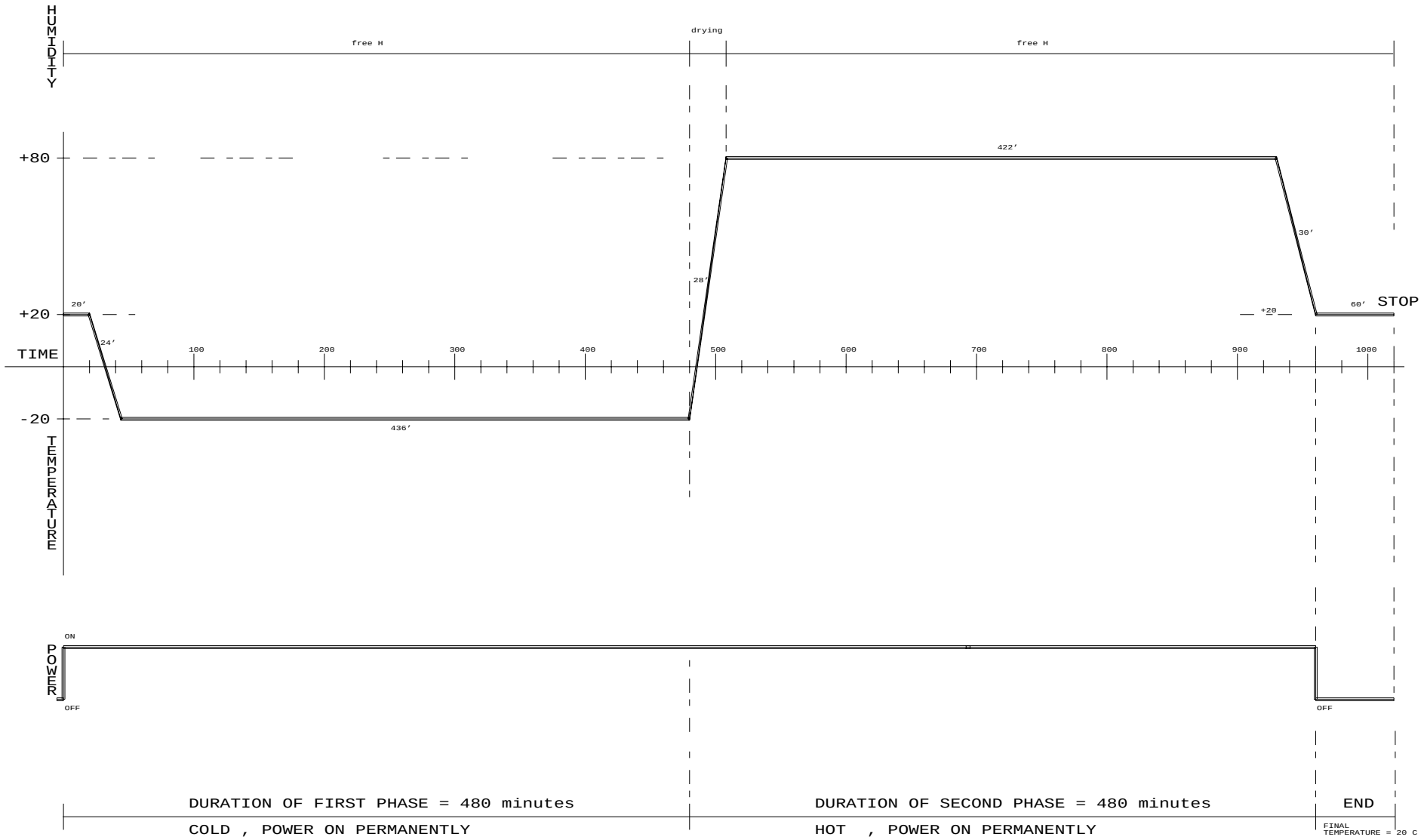
Temperature Tests

NOTES

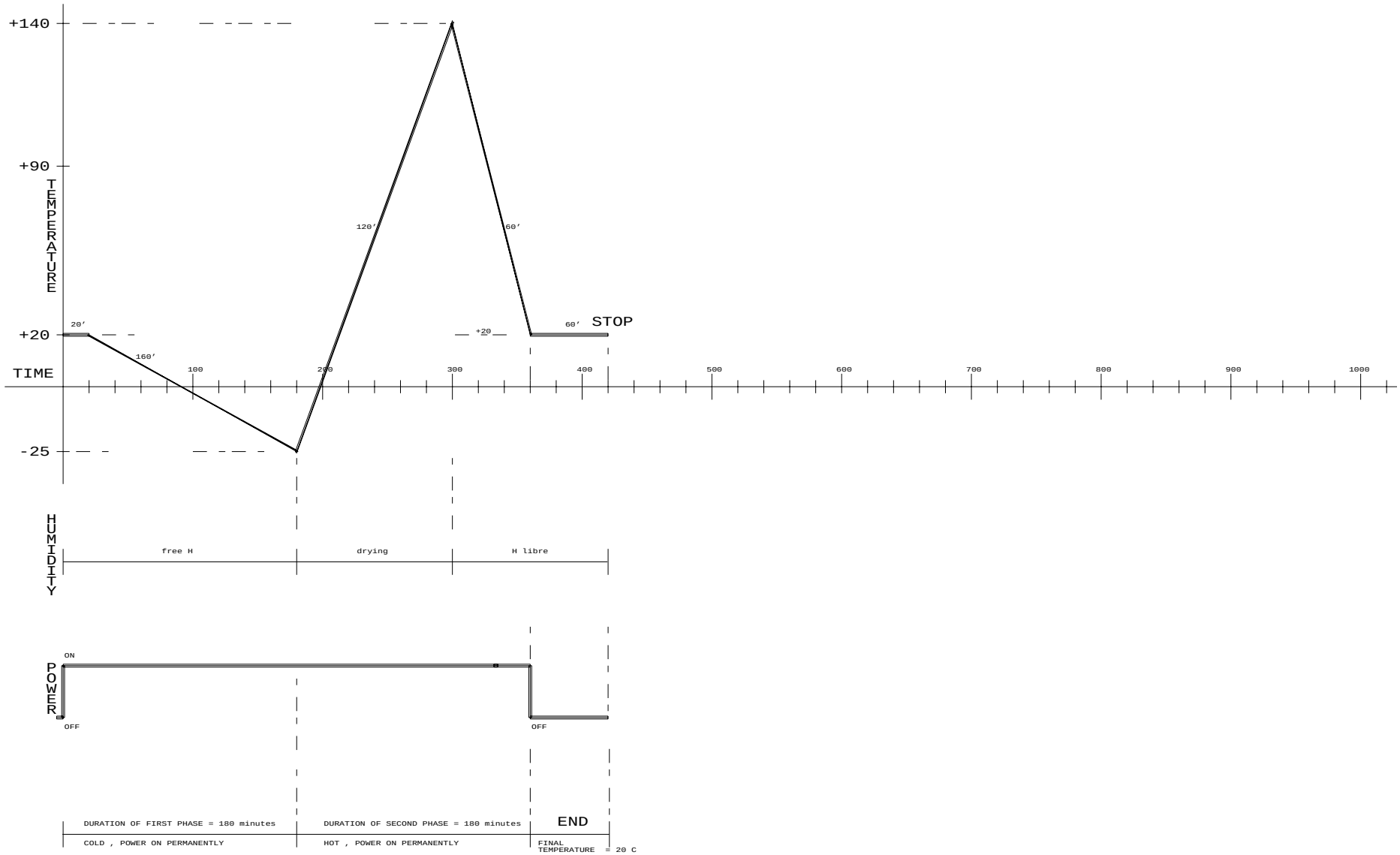
TEMPERATURE TEST OF BOARDS AND ELECTRONIC SUB-ASSEMBLIES : TYPE A BURN-IN



TEMPERATURE TEST OF BOARD AND ELECTRONIC SUB-ASSEMBLIES : COMPONENT TEST



TEMPERATURE TEST OF BOARD AND ELECTRONIC SUB-ASSEMBLIES : RELIABILITY TEST



NOTES

APPENDIX A

- **Distribution Signals**

NOTES

Distribution of signals in the interface connector

RS232D side with SUB D 25

PIN N°	SIGNAL NAME	EIA RS232D	CCITT V24
1	PG Ground Protection		101
2	TXD Transmitted Data	BA	103
3	RXD Received Data	BB	104
4	RTS Request To Send	CA	105
5	CTS Clear To Send	CB	106
6	DSR Data Set Ready	CC	107
7	GND Ground Signal	AB	102
8	DCD Data Carrier Detect	CF	109
20	DTR Data Terminal Ready	CD	108/2

RS232D (EIA/TIA 574) side with SUB D 9

PIN N°	SIGNAL NAME	EIA TIA 574
3	TXD Transmitted Data	103
2	RXD Received Data	104
7	RTS Request To Send	105
8	CTS Clear To Send	106
6	DSR Data Set Ready	107
5	GND Ground Signal	102
1	DCD Data Carrier Detect	109
4	DTR Data Terminal Ready	108/2

RS422A/RS485 side : Pheonix Contact 5 points

RS422A MODE				RS485 MODE		GROUND
+RX	-RX	+TX	-TX	+TX/+RX	-TX/-RX	
1	2	3	4	3	4	5

+RX -RX : RS422A line reception
+TX -TX : RS422A line transmission
+TX/+RX -TX/-RX : RS485 line transmission/reception
GROUND : Electrical ground

In the rest state (no activity on the line), the **TX** and **RX** lamps should be off. In the contrary case, a problem due to a bad connection (**bias inversion**) or a lack of **bias** on the line is probable.

APPENDIX B

- **Troubleshooting**

NOTES

TROUBLESHOOTING

In idle state (no line activity), the **TX** and **RX** lamps should be off, and the **POWER** lamp should be on. The status of the other lamps depends on the operating mode.

– Check that the **RX** lamp is off in the idle state (no line activity).

If this is not the case, the problem is probably due to incorrect installation (**inverted bias)** or because the line is not **biased**. Only one bias per line is required.

– The **TX** lamp remains off.

Check the following:

In RS232 transmission, if the serial driver needs control signals, configure **SW2**. In most cases, permanently enabling **CTS, DSR** and **DCD** is sufficient.

The RS232 connection cable (with PCs, the cable should not be crossed, and **SW1** should be set to **DTE** position). The RS232 cables supplied with the unit are not crossed.

The position of switch **SW1:**
with an uncrossed cable and a PC: DTE position
with a crossed cable and a PC: DCE position
with an uncrossed cable and a MODEM: DCE position
with a crossed cable and a MODEM: DTE position

– In RS422 point-to-point or multipoint master mode, the **RTS/DTR** lamp remains off.

Configure **SW2** in **permanent transmission validation** mode.

– In RS422 multipoint slave mode or in RS485 mode the **RTS/DTR** lamp is always **on**.

Check the configuration of **SW2**:

In these two modes, transmission cannot be validated permanently, but it must be controlled by either the **RTS** signal or by the **DTR** signal, depending on the serial driver.

Check that the serial driver correctly handles the **RTS** or **DTR** signal (see the signal-timing diagram on page 2-5). If not, generate the **RTS** signal with a shunt (configuration n°1 or n°2 on pages 2-7 and 2-8), or use the **xxMI400/RTS** model with automatic transmission control.

– In RS422 multipoint slave mode or in RS485 mode, the **RTS/DTR** lamp remains **off**.

Check the configuration of **SW2**, transmission validation by either **RTS** or **DTR**.Check that the serial driver correctly handles the **RTS** or **DTR** signal (see the signal-timing diagram on page 2-5). If not, generate the **RTS** signal with a shunt (configuration n°1 or n°2 on pages 2-7 and 2-8), or use the **xxMI400/RTS** model with automatic transmission control.

– In RS422 multipoint slave mode or in RS485 mode, numerous transmission errors.

Check the line bias, only one bias per line is required.

– The lamps operate normally, but no correct replies.

Check the cabling on the RS422A/RS485 connector.

Check the bias of the RS422A/RS485 signals in the idle state. In an idle state, the +TX and +RX differential signals are at a lower potential than the -TX and -RX signals. **This remark is particularly important when connecting other RS422A-RS485 interfaces. In effect, there is considerable confusion concerning the idle state in which the line should be found, and concerning the names for signals +TX, +RX, -TX and -RX (A, A', B and B') in the various interfaces of different manufacturers.**

APPENDIX C

- **Extract from EIA standard**
- **Cable length**

NOTES

EXTRACTS FROM THE EIA STANDARD AND RS422A AND RS485 INTERFACE DEFINITION

The table below shows characteristics of the EIA standard concerning the EIA/TIA-562 recommendation (**RS232**, EIA/TIA-574, EIA/TIA-561, etc.), **RS422A** and **RS485**.

It is useful to note in particular the maximum cable lengths allowed for the different standards.

SPECIFICATIONS		**EIA/TIA-562 (RS232 etc.)**	**RS-422A**	**RS-485**
Type of communication		Unipolar	Deferred	Deferred
Number of transmitters and receivers allocated per line		1 transmitter 1 receiver	1 transmitter 10 receivers	32 transmitters 32 receivers
Maximum cable length		16.5 meters	1,320 meters	1,320 meters
Maximum speed		64 Kbits/sec	10 Mbits/sec (over13 m)	10 Mbits/sec (over13 m)
Voltage on transmitter in common mode		± 25V	± 7V	-7V to +12V
Transmitter voltage level	Loaded	± 5V	± 2V	± 1.5V
	No load	± 15V	± 5V	± 5V
Load resistor on transmitter		3 to 7 KΩ	100 Ω	54 Ω
Maximum Transmitter current loss	On			± 100 µA
	Off	Max V/300 Ω	± 100 µA	± 100 µA
Rise time		Max 30V/µs		
Voltage range on receiver input		± 15V	-7V to +7V	-7V to +12V
Reception sensitivity		± 3V	± 200 mV	± 200 mV
Receiver input resistor		3 to 7 KΩ	Min 4 KΩ	Min 12 KΩ

STATUS OF EIA/TIA-562 (RS232), RS422A/485 SIGNALS

VOLTAGE	NEGATIVE	POSITIVE
BINARY STATE	1	0
CONDITION	MARK	SPACE
FUNCTION	OFF	ON

CHARACTERISTICS OF RS422A-RS485 SIGNAL IN IDLE STATE

EIA RS442A/485 - CCITT V11	
+ TX A - TX B	A has a lower potential than B in the idle state (1, MARK or OFF)
+ RX A' - RX B'	A' has a lower potential than B' in the idle state (1, MARK or OFF)

NOTE:

In an idle state, differentials signals +TX and +RX are at a lower potential than signals -TX and -RX.
This remark is particularly important when connecting other RS422A-RS485 interfaces. In effect, there is considerable confusion concerning the idle state in which the line should be found, and in the names for signals +TX, +RX, -TX and -RX (A, A', B and B') in the various interfaces of different manufacturers.

PARTICULARITIES OF RS422A AND RS485 TRANSMISSION LINES

TERMINATION RESISTOR:

The line termination resistor for the receiver in RS422A mode (100 Ohms) and for the transmitter/receiver in RS485 mode (120 Ohms) reduces reflections generated in a long high-speed line that may interfere with reception.

The termination resistor is not required in the following case:

Environment free from interference and if the distance and speed are within 1,000 metres at 9,600 bits/sec or 100 metres at 122 Kbits/sec.

BIAS:

Bias of the line is necessary in order to have a stable state:

- in RS485 mode on transition from transmission to reception,

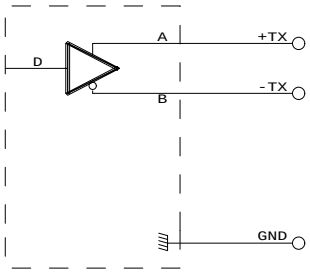
- in RS422A mode if several transmitters are on the bus and consequently the high impedance state must be used.

Only one bias per line is necessary.

RS422A CONNECTION (4 WIRES)

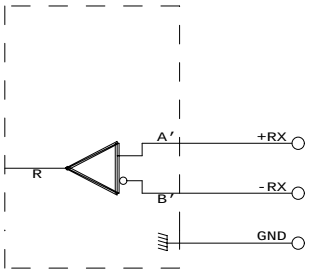
SIMPLEX

RS422A INTERFACE FOR
POINT TO POINT OR MULTIPOINT
MASTER TYPE CONNECTION



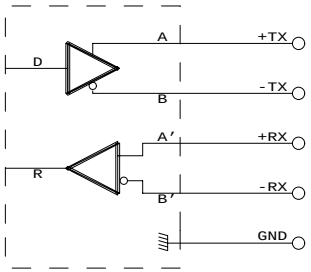
SIMPLEX

RS422A INTERFACE FOR
POINT TO POINT OR MULTIPOINT
SLAVE TYPE CONNECTION



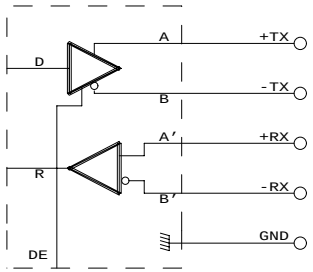
FULL-DUPLEX

RS422A INTERFACE FOR
POINT TO POINT OR MULTIPOINT
MASTER TYPE CONNECTION



FULL-DUPLEX

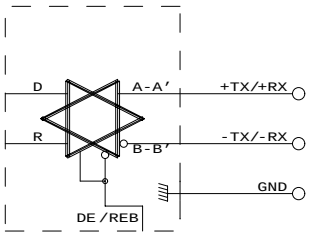
RS422A INTERFACE FOR
POINT TO POINT OR MULTIPOINT
MASTER/SLAVE TYPE CONNECTION
(POLLING - SELECTING)



RS485 WIRES (2 WIRES)

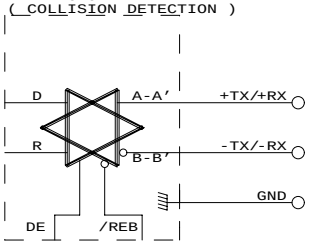
HALF-DUPLEX

RS485 INTERFACE FOR
POINT TO POINT OR MULTIPOINT
MASTER/SLAVE TYPE CONNECTION
(POLLING - SELECTING)

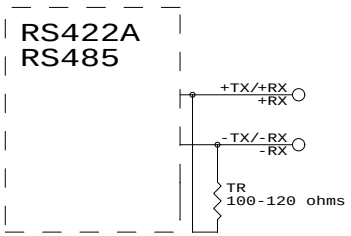


HALF-DUPLEX

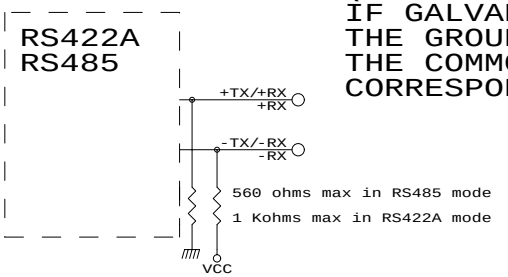
RS485 INTERFACE FOR
POINT TO POINT OR MULTIPOINT
MULTIMASTER TYPE CONNECTION
WITH ECHO
(COLLISION DETECTION)



TERMINATION RESISTOR



BIAS



TYPE OF CONNECTION CABLE :

SHIELDED OR UNSHIELDED TWISTED PAIR(s)
22-24 GAUGE AWG
NOMINAL IMPEDANCE 100-120 OHMS
CAPACITY BETWEEN CONDUCTORS 50 pF
CAPACITY BETWEEN SHIELDING AND CONDUCTORS 70pF MAX

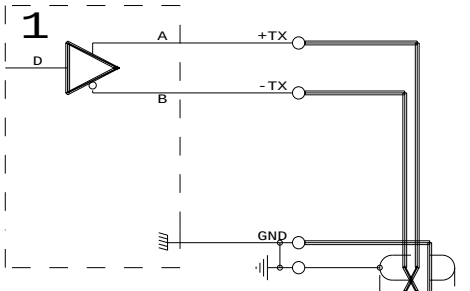
SHIELDED CABLE IS REQUIRED IN VERY NOISY ENVIRONMENTS;
CONNECT IT TO THE GROUND ON ONE SIDE ONLY.

THE GROUND CONNECTION MUST BE MADE WITH EITHER A WIRE
COMMON TO ALL THE INTERFACES OR BY A GROUND
CONNECTION FOR EACH INTERFACE.
(SAME GROUND REFERENCE FOR ALL EQUIPMENTS).
IF GALVANICALLY ISOLATED INTERFACES ARE USED,
THE GROUND CONNECTION IS NOT REQUIRED.
THE COMMON MODE VOLTAGE IS LIMITED TO THE VOLTAGE
CORRESPONDING TO THE GALVANIC ISOLATION.

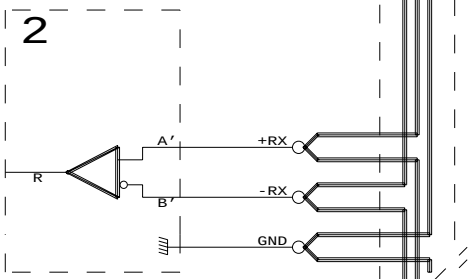
RS422A CONNECTION (4 WIRES)

SIMPLEX

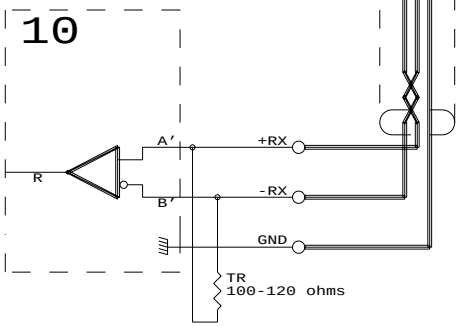
RS422A INTERFACE MULTIPOINT
MASTER TYPE CONNECTION



RS422A INTERFACE MULTIPOINT
INTERMEDIATE SLAVE TYPE CONNECTION

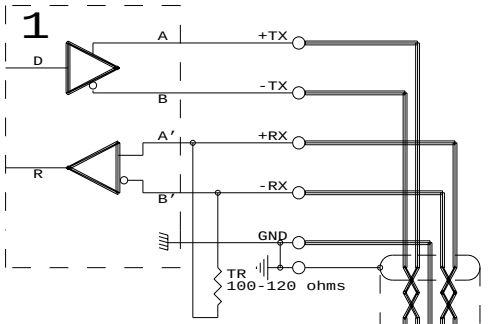


RS422A INTERFACE MULTIPOINT
TERMINAL SLAVE TYPE CONNECTION

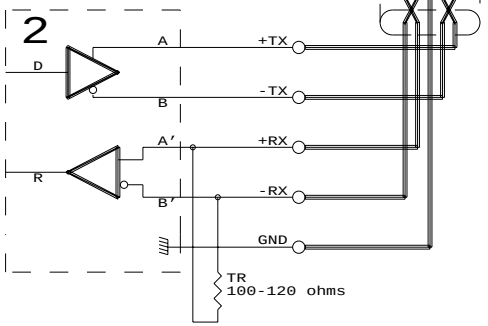


FULL-DUPLEX

RS422A INTERFACE
POINT TO POINT CONNECTION

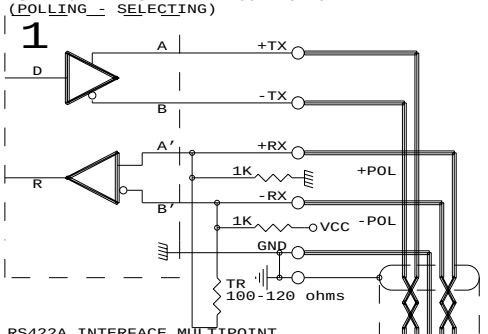


RS422A INTERFACE
POINT TO POINT CONNECTION

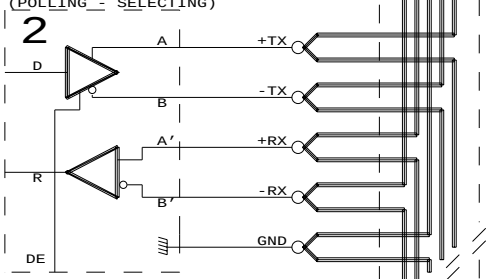


FULL-DUPLEX

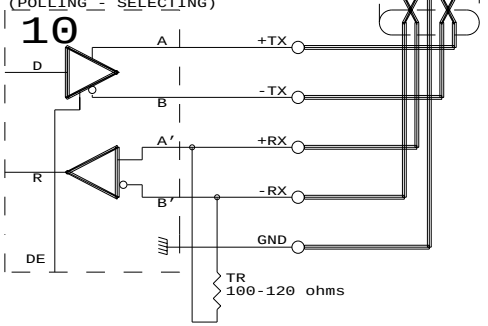
RS422A INTERFACE
MULTIPOINT MASTER TYPE CONNECTION
(POLLING - SELECTING)



RS422A INTERFACE MULTIPOINT
INTERMEDIATE SLAVE TYPE CONNECTION
(POLLING - SELECTING)



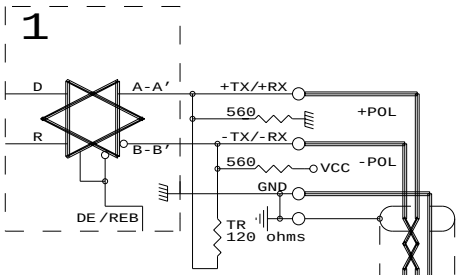
RS422A INTERFACE MULTIPOINT
TERMINAL SLAVE TYPE CONNECTION
(POLLING - SELECTING)



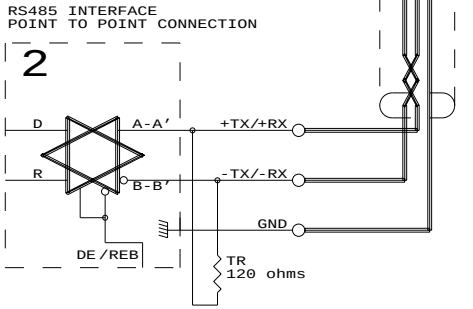
RS485 CONNECTION (2 WIRES)

HALF-DUPLEX

RS485 INTERFACE
POINT TO POINT CONNECTION

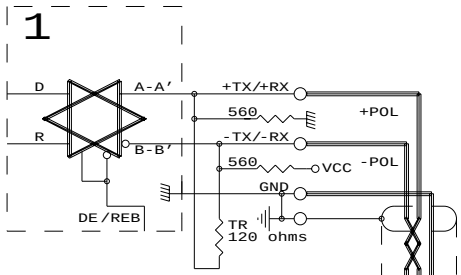


RS485 INTERFACE
POINT TO POINT CONNECTION

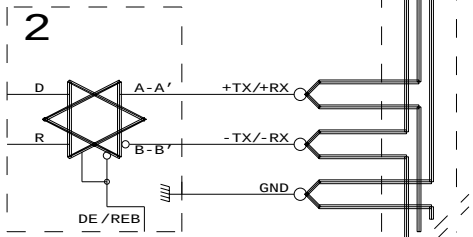


HALF-DUPLEX

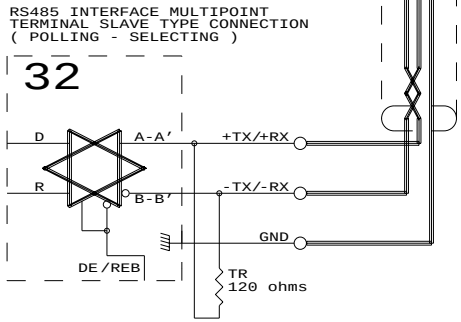
RS485 INTERFACE MULTIPOINT
MASTER TYPE CONNECTION
(POLLING - SELECTING)



RS485 INTERFACE MULTIPOINT
INTERMEDIATE SLAVE TYPE CONNECTION
(POLLING - SELECTING)

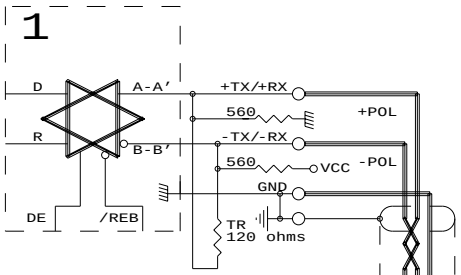


RS485 INTERFACE MULTIPOINT
TERMINAL SLAVE TYPE CONNECTION
(POLLING - SELECTING)

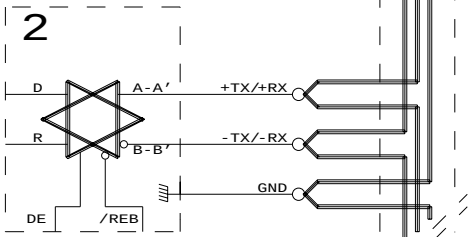


HALF-DUPLEX

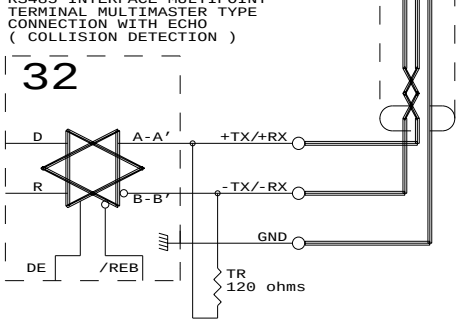
RS485 INTERFACE MULTIPOINT
TERMINAL MULTIMASTER TYPE CONNECTION
WITH ECHO (COLLISION DETECTION)



RS485 INTERFACE MULTIPOINT
INTERMEDIATE MULTIMASTER TYPE
CONNECTION WITH ECHO
(COLLISION DETECTION)

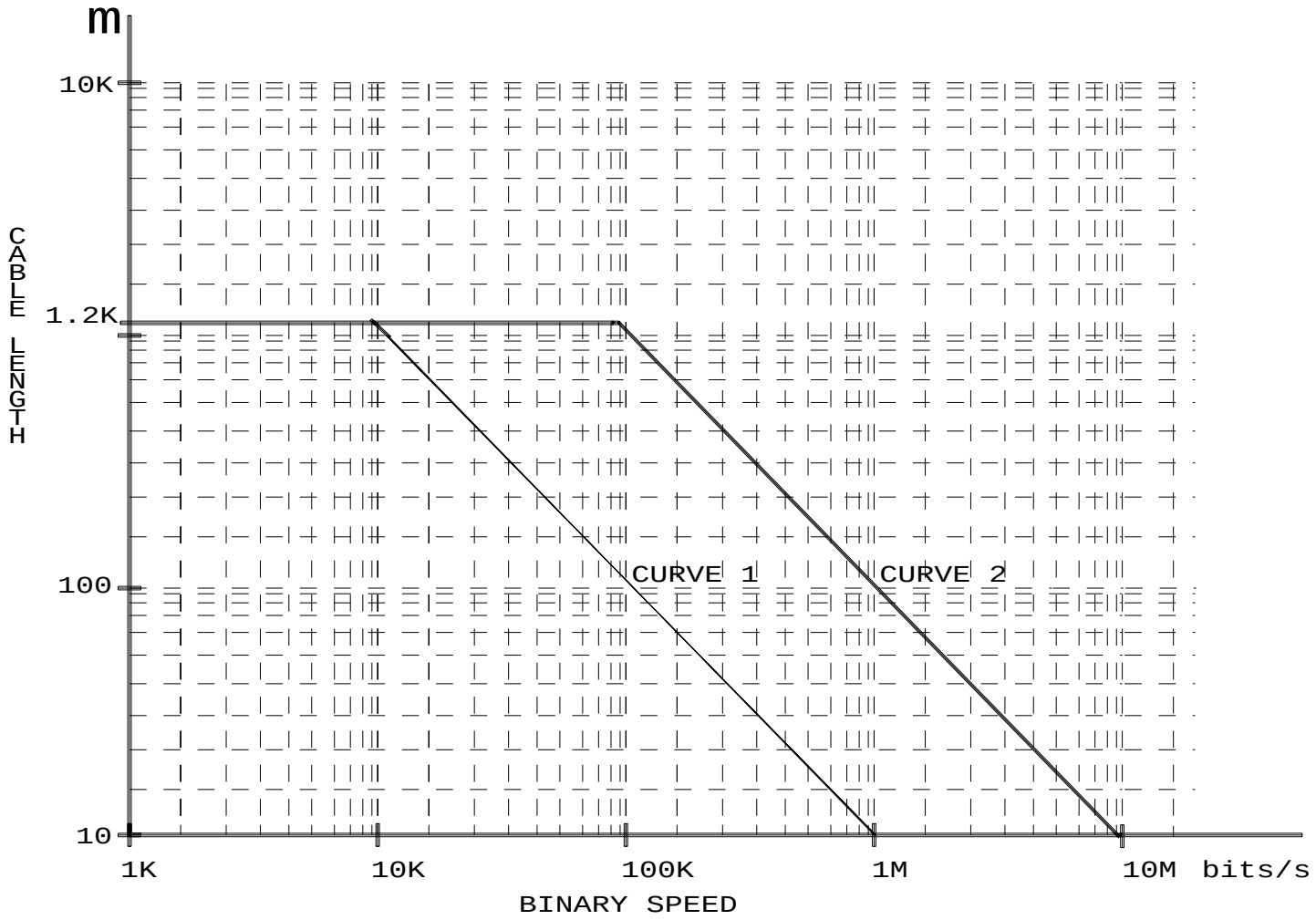


RS485 INTERFACE MULTIPOINT
TERMINAL MULTIMASTER TYPE
CONNECTION WITH ECHO
(COLLISION DETECTION)



CABLE LENGTH FOR AN RS422A OR RS485 LINE

MINIMUM VALUES FOR A 24 GAUGE AWG TWISTED PAIR CABLE



CURVE 1 : CONNECTION WITHOUT TERMINATION RESISTOR(s)

CURVE 2 : CONNECTION WITH TERMINATION RESISTOR(s)

COMMUNICATION ET SYSTEMES

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