

# **PM2534 and PM2535**

## **with PM9190 RS232-C/V24 interface**

**Operation Manual/Gebrauchsanleitung/Notice d'emploi**

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**PHILIPS**

## **IMPORTANT**

In all correspondence concerning this instrument, please quote the type number and serial number as given on the type plate.

**NOTE:** *The design of this instrument is subject to continuous development and improvement. Consequently, this instrument may incorporate minor changes in detail from the information contained in this manual.*

## **WICHTIG**

Bei Schriftwechsel Über dieses Gerät wird gebeten, die genaue Typenbezeichnung und die Gerätenummer anzugeben. Diese befinden sich auf dem Leistungsschild.

**BEMERKUNG:** *Die Konstruktion und Schaltung dieses Geräts wird ständig weiterentwickelt und verbessert. Deswegen kann dieses Gerät von den in dieser Anleitung stehenden Angaben abweichen.*

## **IMPORTANT**

Dans votre correspondance et dans vos réclamations se rapportant à cet appareil, veuillez toujours indiquer le numéro de type et le numéro de série qui sont marqués sur la plaquette de caractéristiques.

**REMARQUE:** *Cet appareil est l'object de développements et améliorations continuels. En conséquence, certains détails mineurs peuvent différer des informations données dans la présente notice d'emploi.*

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## 1. INTRODUCTION

The PM9190 RS232C/V24 interface enables the multimeters PM2534 and PM2535 to communicate with other devices, equipped with this communication interface, like personal computers, printers and so on.

This Operation Manual gives a overview of the specification and commands related to the interface in combination with these multimeters. For the device programming commands and extended device status information, see the relevant chapters of the Operation Manuals of the multimeters.

## 2 SPECIFICATION OF THE RS232-C/V24 INTERFACE

### 2.1 SPECIFICATION

Operating modes : COMMUNICATION mode,  
                           controller + one device (terminal)  
                           MULTIDROP mode,  
                           controller + more (addressable) devices  
                           TALK ONLY mode  
                           printer + one device (terminal)

Character length : 7 or 8 bits

Baudrate : 110 to 9600 baud

Stopbits (fixed) : COMMUNICATION mode,  
                           1 or 2 stopbits allowed for received data  
                           2 stopbits transmitted  
                           MULTIDROP mode,  
                           2 stopbits required for received data  
                           2 stopbits transmitted  
                           TALK ONLY mode  
                           2 stopbits transmitted

Parity : odd, even or no parity

Handshake : hardware (CTS-DTR protocol) or  
                           software (Xon-Xoff protocol)

Used code : ISO 7-bit code (ISO 646)

### 2.2 SWITCH SETTINGS

#### 2.2.1 Baudrate

BAUDRATE	110	150	300	600	1200	2400	4800	9600
SWITCHES								
BD1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
BD2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
BD3	OFF	OFF	OFF	OFF	ON	ON	ON	ON

#### 2.2.2 Character length, parity, handshake

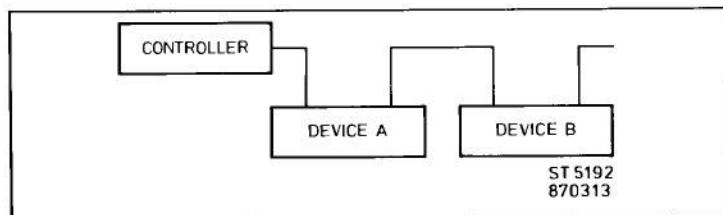
SWITCH	DESCRIPTION
8DA	ON: character length is 8 bits OFF: character length is 7 bits
PAR	ON: parity on OFF: parity off
ODD	ON: odd parity OFF: even parity
XON	ON: Xon/Xoff handshake on OFF: Xon/Xoff handshake off, hardware handshake.

### 2.2.3 Multidrop mode

In the multidrop mode it is possible to control more than one device with the same controller, using the SOH-ETX or the STX-EOT protocol.

SOH (code 01H) or STX (code 02H) followed by an identification character (device address, to be set with switches AD4...AD0) will select the device; ETX (code 03H) or EOT (04H) will deselect the device.

*Note: The last device in the chain should **not** be set in multidrop mode. This device is selected by de selecting all other devices.*



*Multidrop mode*

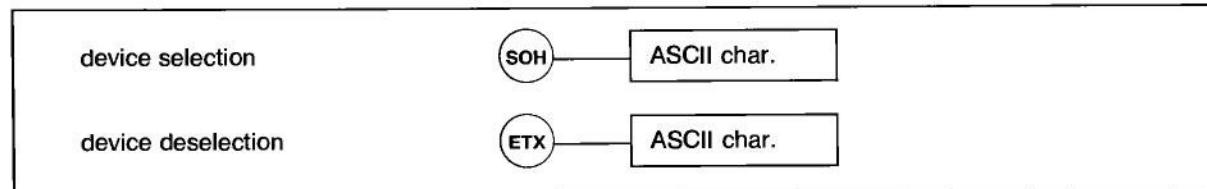
#### Multidrop mode switch MDR.

SWITCH	DESCRIPTION
MDR	ON: the multidrop mode is selected OFF: the multidrop mode is not selected In this case the switches AD0-AD4 and the SOH switch are disabled.

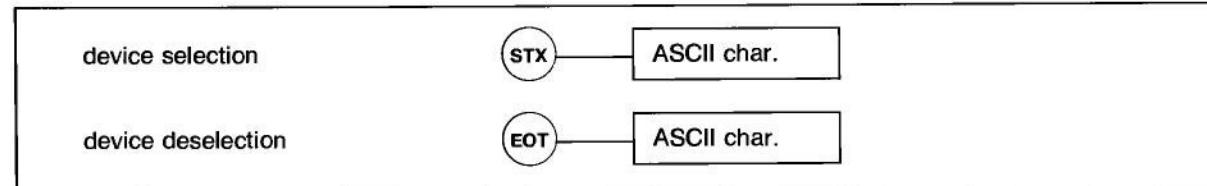
#### SOH switch

SWITCH	DESCRIPTION
SOH	ON: the device can be selected and deselected with the SOH-ETX protocol. OFF: the device can be selected and deselected with the STX-EOT protocol.

#### SOH-ETX protocol (SOH switch on):



#### STX-EOT protocol (SOH switch off):



**Device selection switches AD4-AD0.**

A binary code can be set with these switches. This code corresponds to an ASCII character in accordance with the ISO-5 table.

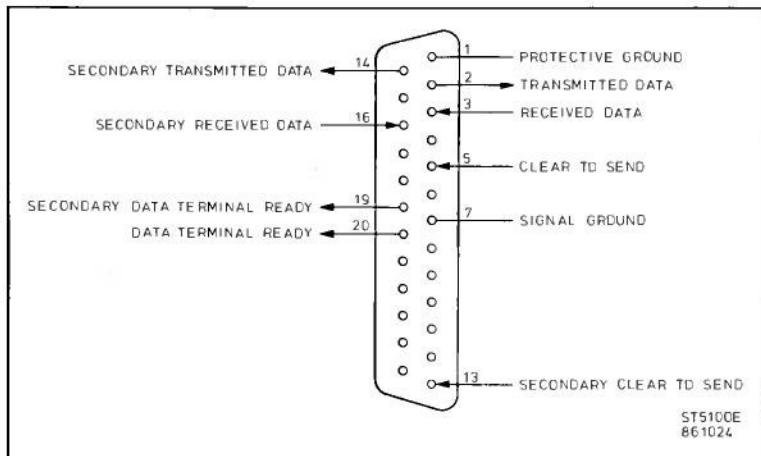
The table below provides the switch settings and the corresponding characters. Also the octal, hexadecimal and decimal equivalents are given.

SWITCH	DESCRIPTION
AD4...AD0	ON: 1 OFF: 0      device selection character, see table below

AD4...AD0	ASCII char.	Hex.	Dec.	Oct.
00000	@	40	64	100
00001	A	41	65	101
00010	B	42	66	102
00011	C	43	67	103
00100	D	44	68	104
00101	E	45	69	105
00110	F	46	70	106
00111	G	47	71	107
01000	H	48	72	110
01001	I	49	73	111
01010	J	4A	74	112
01011	K	4B	75	113
01100	L	4C	76	114
01101	M	4D	77	115
01110	N	4E	78	116
01111	O	4F	79	117
10000	P	50	80	120
10001	Q	51	81	121
10010	R	52	82	122
10011	S	53	83	123
10100	T	54	84	124
10101	U	55	85	125
10110	V	56	86	126
10111	W	57	87	127
11000	X	58	88	130
11001	Y	59	89	131
11010	Z	5A	90	132
11011	[	5B	91	133
11100	\	5C	92	134
11101	]	5D	93	135
11110	^	5E	94	136
11111	-	5F	95	137

### 2.3 CONNECTOR PINNING

The interface is provided with a 25-pin male D-connector with the following connections:



*RS232-C/V24 connector*

### 2.4 CABLE FOR CONNECTION BETWEEN THE P3200/IBM AT AND THE PM9190

P3200  
9 P FEMALE

PM9190  
25 P FEMALE

#### SIGNAL DIRECTION

RxD	2	<	2	TxD
TxD	3	>	3	RxD
DTR	4	>	5	CTS
SG	5	><	7	SG
CTS	8	>	20	DTR

statement: OPEN "COM1:4800,N,8,1,CD,CS65000,DS,RS,LF" A\$ #1  
Baudrate 4800, no parity, word length 8 bits, 1 stopbit

### 2.5 CABLE FOR CONNECTION BETWEEN THE PM3102/IBM XT AND THE PM9190

P3102  
25 P FEMALE

PM9190  
25 P FEMALE

#### SIGNAL DIRECTION

GND	1	><	1	GND
RxD	2	<	2	TxD
TxD	3	>	3	RxD
RTS	5	>	5	CTS
GND	7	><	7	GND
DSR	20	<	20	DTR

The computer should have been set in the communication mode.

The OPEN command:

OPEN "COM:4800,n,8,2,RS,DS5000,LF" A\$ #1

Opens a device with: 4800 baud

- : no parity
- : 8 data bits, 2 stopbits
- : RS suppresses RTS
- : DS controls the DSR
- : LF controls automatic linefeed after each carriage return

### 3. PROGRAMMING THE PM2534 AND PM2535

#### 3.1 INTERFACE MESSAGES

##### 3.1.1 Remote/local functions

The following REMOTE/LOCAL messages are accepted:

MESSAGE	DESCRIPTION
<b>ESC1</b>	Go to the local state
<b>ESC2</b>	Go to the remote state
<b>ESC3</b>	Go to the local state and unlock the Local Lock Out state
<b>ESC5</b>	Local Lock out

##### 3.1.1.1 Remote state

In this state the instrument can be controlled via the interface.

When the display indication "REM" is on, the instrument is in the remote state. In this state, the instrument can be controlled by device-dependent data via its interface. All control of the instrument via the front-panel is disabled, except for the CHECK and single trigger keys.

The remote state is entered when the message **ESC2** is sent to the device.

##### 3.1.1.2 Local state

In the local state the instrument can be operated via its keyboard.

The local state is entered:

- after power on
- via the instrument keyboard, if the function is not locked out (see "Local Lock Out")
- via the RS232-C/V24 interface after the **ESC1** or the **ESC3** message

##### 3.1.1.3 Local Lock Out

Via the keyboard a return to local (rtl) function is provided. Pressing this key sequence when the instrument is in the remote state, causes a return to the local state. If the Local Lock Out message (**ESC5**) has been sent to the device, the rtl function is locked.

The rtl function will be unlocked when **ESC3** is sent to the device. The instrument enters also the local state.

##### 3.1.2 Device clear

After the device clear message **ESC4** the instrument re-initialises.

### 3.2 INTERFACE PROGRAMMING

The following program data can be given

Function	Message	Description
Separators	<b>SPR_nn [,nn]</b>	Setting of the record separators. nn is the decimal equivalent of a character of the ISO code table.
Identity	<b>ID_?</b>	On receipt of this command the identity is returned.
Interface test	<b>TSI_U</b> <b>TSI_&lt;dec 170&gt;</b>	On receipt of these commands a self test is performed. 170 is the decimal value and can be programmed on most controllers with CHR\$(170).

Notes: [ ] means optional  
— = space

### 3.2.1 Separators

A record separator terminates the output or input strings. It indicates that there is no additional information available. The instrument is capable of handling single and double input and output record separators. The record separator character(s) can be programmed to one (LF) or two characters (CR and LF) of the ISO code table. An ESC character is not acceptable as a record separator but no error message is given and the last programmed separator(s) will remain valid.

At POWER ON or after a RESET the separator is NL (LF)

### 3.2.2 Identity

If the interface programming code **ID\_?** is decoded, the instrument responds with PM2534x Syy (PM2535x Syy).

Command: **ID\_?**      x = hardwareversion (e.g. 0)  
                        yy = softwareversion (e.g.01)

Any additional data bytes sent in the program string are lost.

### 3.2.3 Interface test

On receipt of **TSI\_U** an interface self-test is performed. If correct, a response with a byte of decimal equivalent 170 is sent on the bus when the instrument becomes talker. If a byte of decimal equivalence 170 is received instead of the U, the same interface self-test is performed, but the character U is sent out on the bus.

Commands: **TSI\_<dec. 170>**      Respond: **U**  
**TSI\_U**                                    Respond: **<dec. 170>**

*Notes:* - the character U must be capital U.  
- on most controllers <dec. 170>can be programmed with CHR\$ (170).  
- as it takes some time to do the selftest, a delay of approx. 2 sec. should be in the program between the TSI command and the input of the result.

## 3.3 DEVICE PROGRAMMING

For the device programming see the relevant chapters in the Operation Manual of the basic instruments. To trigger an instrument, ESC8 can be used, next to the start measurement (X [1]) command.

## 3.4 OUTPUT DATA

### 3.4.1 General rules

To output measurement results via the RS232C/V24 interface the following commands must be used:

Instrument to printer

Set the instrument to talk-only. Refer to the Operation Manual of the instrument. The measurement results will be automatically output.

Instrument to controller

Command: **EMO\_A[UTO]** (Enable Measurement Output)

Measurement results will be automatically output to the controller after each measurement. The instrument determines the output of data.

The EMO\_A[UTO] function can only be switched off by another EMO command. EMO\_0 results in an immediate stop of outputs of measuring results.

Command: **EMO** (Enable Measurement Output)  
**EMO\_[n]**      (n < 2<sup>23</sup>)

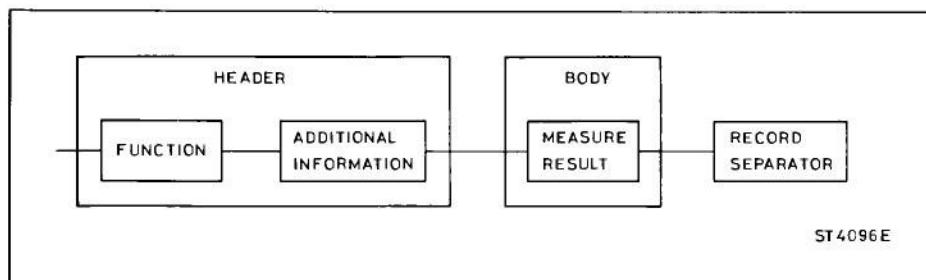
Allows the instrument to output 1 or n measurement results.

*Remarks:* - A new EMO command (Enable measurement output) destroys the previous one.

- EMO commands only must be used in case of measurement results and not for status data or query(?) responses, calibration data and buffer contents.

### 3.4.2 Measuring data

Measurements is sent out as header body combinations



### 3.4.3 Device status data

The device status data of the instrument is represented in one status byte (8bits)

The device will output the decimal equivalent of its status byte on receipt of command **ESC 7**, Status Request.

The device status byte is built-up as follows:

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	0	AB	BSY	EF3	EF2	EF1	EF0

*Note: For detailed status information see the relevant chapter in the Operation Manual of the basic instrument.*

## APPENDIX A

## ISO—7 BIT CODING TABLE

COLUMN →		0		1		2		3		4		5		6		7		
ROW ↓	b7 → b4 b3 b2 b1 b6 → b5 →	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1		
0	0 0 0 0 NUL 0	DLE	16	SP	32	0	0	48	16	@	64	0	P	80	16	~	96	
1	0 0 0 1 SOH 1	GTL	DC1	17	LLO	1	33	1	1	49	17	A	65	1	Q	81	17	
2	0 0 1 0 STX 2	DC2	18	"	34	2	2	50	18	B	66	2	R	82	18	b	98	
3	0 0 1 1 ETX 3	DC3	19	#	35	3	3	51	19	C	67	3	S	83	19	c	99	
4	0 1 0 0 EOT 4	SDC	DCA	20	DCL	\$	36	4	52	20	D	68	4	T	84	20	d	100
5	0 1 0 1 ENQ 5	PPC	NAK	21	PPU	%	37	5	53	21	E	69	5	U	85	21	e	101
6	0 1 1 0 ACK 6	SYN	22	&	38	6	6	54	22	F	70	6	V	86	22	f	102	
7	0 1 1 1 BEL 7	ETB	23	,	39	7	7	55	23	G	71	7	W	87	23	g	103	
8	1 0 0 0 BS 8	GET	CAN	24	SPE	(	40	8	56	24	H	72	8	X	88	24	h	104
9	1 0 0 1 HT 9	TCT	EM	25	SPD	)	41	9	57	25	I	73	9	Y	89	25	i	105
A	1 0 1 0 LF 10	SUB	26	*	42	10	:	58	26	J	74	10	Z	90	26	j	106	
B	1 0 1 1 VT 11	ESC	27	+	43	11	:	59	27	K	75	11	l	91	27	k	107	
C	1 1 0 0 FF 12	FS	28	,	44	12	<	60	28	L	76	12	\	92	28	l	108	
D	1 1 0 1 CR 13	GS	29	-	45	13	=	61	29	M	77	13	]	93	29	m	109	
E	1 1 1 0 SO 14	RS	30	.	46	14	>	62	30	N	78	14	^	94	30	n	110	
F	1 1 1 1 SI 15	US	31	/	47	15	?	63	UNL	O	79	15	-	95	o	111	DEL 127	

ADDRESSED  
COMMAND GROUP

UNIVERSAL  
COMMAND GROUP

LISTEN  
ADDRESS  
GROUP

SECONDARY  
ADDRESS  
GROUP

## APPENDIX B

### P2000C

```

100 REM PROGRAM "EXAMPLE1"
110 D=10 :REM ADDRESS OF PM2535
120 IEC INIT :REM INITIALISATION OF THE BUS
130 IEC PRINT #D,"FNC VDC" :REM DC MEASUREMENTS
140 IEC PRINT #D,"RNG A" :REM AUTO RANGING
150 IEC PRINT #D,"MSP 2" :REM MEASURING SPEED 2
160 IEC PRINT #D,"RSL 4" :REM RESOLUTION 4 DIGITS
170 IEC PRINT #D,"FIL ON" :REM FILTER ON
180 IEC PRINT #D,"TRG B" :REM TRIGGER ON "X"
190 IEC PRINT #D,"OUT N" :REM NUMERIC OUTPUT
200 PRINT CHR$(12) :REM CLEAR SCREEN
210 PRINT "The results of 10 measurements."
220 PRINT
230 FOR N=1 TO 10
240 IEC PRINT #D,"X" :REM START A MEASUREMENT
250 IEC INPUT #D,I$ :REM PUT THE RESULT IN I$
260 PRINT I$
270 NEXT N
280 PRINT
290 PRINT "End of example"
300 IEC END
310 END

```

```

100 REM PROGRAM "EXAMPLE2"
110 D=10 :REM ADDRESS OF PM2535
120 IEC INIT :REM INITIALISATION OF THE BUS
130 REM SETTINGS OF PM2535
140 IEC PRINT #D,"FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
150 IEC PRINT #D,"MSR 1" :REM MASKING PM2535
160 PRINT CHR$(12) :REM CLEAR SCREEN
170 PRINT "The results of 10 measurements with SRQ." :PRINT
180 IEC ON SRQ GOSUB 300 :REM MASKING THE CONTROLLER FOR SRQ
190 FLAG=1
200 FOR N=1 TO 10
210 IEC PRINT #D,"X"
220 IF FLAG=1 THEN 220
230 FLAG=1
240 NEXT N
250 PRINT:PRINT "End of example 2."
260 IEC END
270 END
300 REM SRQ ROUTINE
310 IEC POLL #D,P :REM GET STATUS BYTE FROM PM2535
320 IF P AND 1<>1 THEN 360 :REM IF SRQ HAS NOT BEEN GENERATED
330 IEC INPUT #D,I$ ACCORDING TO MASKING GOTO RETURN
340 PRINT I$
350 FLAG=0
360 RETURN

```

```

100 REM PROGRAM "EXAMPLE3"
110 D=10 :REM ADDRESS OF PM2535
120 AID$="AID 200;" :REM UNIT ADDRES (PM2120)
130 IEC INIT :REM INITIALISATION OF THE BUS
140 REM SETTINGS OF PM2535
150 IEC PRINT #D,"FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
160 REM SETTINGS OF PM2120
170 IEC PRINT #D,AID$+"MD,OPEN 0-19" :REM MODE 0 ALL SWITCHES OPENED
180 PRINT CHR$(12) :REM CLEAR SCREEN
190 PRINT "The results of 10 measurements with PM2120.":PRINT
200 FOR N=1 TO 10
210 IEC PRINT #D,AID$+"CLOSE"+STR$(N-1) :REM CLOSE NEXT SWITCH
220 IF N-1=0 THEN 240
230 IEC PRINT #D,AID$+"OPEN"+STR$(N-2) :REM OPEN PREVIOUSLY CLOSED SWITCH
240 IEC PRINT #D,"X"
250 IEC INPUT #D,I$
260 PRINT I$
270 NEXT N
280 PRINT:PRINT "End of example 3."
290 IEC END
300 END

```

```

100 REM PROGRAM "EXAMPLE4"
110 D=10 :REM ADDRESS OF PM2535
120 AID$="AID 200;" :REM UNIT ADDRES (PM2120)
130 IEC INIT :REM INITIALISATION OF THE BUS
140 REM SETTINGS OF PM2535
150 IEC PRINT #D,"FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
160 IEC PRINT #D,"MSR 1" :REM MASKING PM2535 FOR SRQ
170 REM SETTINGS OF PM2120
180 IEC PRINT #D,AID$+"MD,OPEN 0-19" :REM MODE 0 ALL SWITCHES OPENED
190 PRINT CHR$(12) :REM CLEAR SCREEN
200 PRINT "The results of 10 measurements with PM2120.":PRINT
210 FLAG=1
220 IEC ON SRQ GOSUB 400
230 FOR N=1 TO 10
240 IEC PRINT #D,AID$+"CLOSE"+STR$(N-1) :REM CLOSE NEXT SWITCH
250 IF N-1=0 THEN 270
260 IEC PRINT #D,AID$+"OPEN"+STR$(N-2) :REM OPEN PREVIOUSLY CLOSED SWITCH
270 IEC PRINT #D,"X"
280 FOR W=1 TO 10:NEXT W :REM WAIT 10 msec
290 IF FLAG=1 THEN 290 :REM WAIT FOR SRQ
300 FLAG=1
310 NEXT N
320 PRINT:PRINT "End of example 3."
330 IEC END
340 END
400 REM SRQ ROUTINE
410 IEC POLL #D,P :REM GET STATUS BYTE FROM PM2535
420 IF P AND 1<>1 THEN 460 :REM IF THE SRQ HAS NOT BEEN
430 IEC INPUT #D,I$ GENERATED ACCORDING TO
440 PRINT I$ MASKING GOTO RETURN
450 FLAG=0
460 RETURN

```

## HP85

```

100 REM PROGRAM "EXAMPLE1"
110 D=710                                @ REM ADDRESS OF PM2535
120 ABORTIO 7                             @ REM INITIALISATION OF THE BUS
130 OUTPUT D ; "FNC VDC"
140 OUTPUT D ; "RNG A"
150 OUTPUT D ; "MSP 2"
160 OUTPUT D ; "RSL 4"
170 OUTPUT D ; "FIL ON"
180 OUTPUT D ; "TRG B"
190 OUTPUT D ; "OUT N"
200 CLEAR                                 @ REM DC MEASUREMENTS
                                           @ REM AUTO RANGING
                                           @ REM MEASURING SPEED 2
                                           @ REM RESOLUTION 4 DIGITS
                                           @ REM FILTER ON
                                           @ REM TRIGGER ON "X"
                                           @ REM NUMERIC OUTPUT
                                           @ REM CLEAR SCREEN
210 DISP "The results of 10 measurements."
220 DISP
230 FOR N=1 TO 10
240 OUTPUT D ; "X"                         @ REM START A MEASUREMENT
250 ENTER D ; I$                           @ REM PUT THE RESULT IN I$
260 DISP I$                               @ REM CLEAR SCREEN
270 NEXT N
280 DISP
290 DISP "End of example1"
300 END

```

```

100 REM PROGRAM "EXAMPLE2"
110 D=710                                @ REM ADDRESS OF PM2535
120 ABORTIO 7                             @ REM INITIALISATION OF THE BUS
130 REM SETTINGS OF PM2535
140 OUTPUT D ; "FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
150 OUTPUT D ; "MSR 1"                      @ REM MASKING PM2535
160 CLEAR                                 @ REM CLEAR SCREEN
170 DISP "The results of 10 measurements with SRQ." @ DISP
180 ON INTR 7 GOSUB 300                   @ REM MASKING THE CONTROLLER FOR SRQ
190 F=1
200 FOR N=1 TO 10
210 OUTPUT D ; "X"                         @ REM START A MEASUREMENT
220 ENABLE INTR 7;8                       @ REM ENABLES THE BUS FOR SRQ
230 IF F=1 THEN 230
240 F=1
250 NEXT N
260 DISP @ DISP "End of example 2."
270 END
300 REM SRQ ROUTINE
310 P=SPOLL(D)                            @ REM GET STATUS BYTE FROM PM2535
320 IF P AND 1<>1 THEN 360               @ REM IF SRQ HAS NOT BEEN GENERATED
330 ENTER D ; I$                           ACCORDING TO MASKING GOTO RETURN
340 DISP I$                               @ REM CLEAR SCREEN
350 F=0
360 RETURN

```

```

100 REM PROGRAM "EXAMPLE3"
110 D=710                                @ REM ADDRESS OF PM2535
120 A$="AID 200;"                          @ REM UNIT ADDRES (PM2120)
130 ABORTIO 7                             @ REM INITIALISATION OF THE BUS
140 REM SETTINGS OF PM2535
150 OUTPUT D ; "FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
160 REM SETTINGS OF PM2120
170 OUTPUT D ; A$&"MO,OPEN 0-19"          @ REM MODE 0 ALL SWITCHES OPENED
180 CLEAR                                  @ REM CLEAR SCREEN
190 DISP "The results of 10 measurements with PM2120." @ DISP
200 F=1
210 FOR N=1 TO 10
220 OUTPUT D ; A$&"CLOSE "&VAL$(N-1)      @ REM CLOSE NEXT SWITCH
230 IF N-1=0 THEN 250                      @ REM OPEN PREVIOUSLY CLOSED SWITCH
240 OUTPUT D ; A$&"OPEN "&VAL$(N-2)        @ REM START A MEASUREMENT
250 OUTPUT D ; "X"
260 WAIT 10
270 ENTER D ; I$
280 DISP I$
290 NEXT N
300 DISP @ DISP "End of example 3."
310 END

```

```

100 REM PROGRAM "EXAMPLE4"
110 D=710                                @ REM ADDRESS OF PM2535
120 A$="AID 200;"                          @ REM UNIT ADDRES (PM2120)
130 ABORTIO 7                             @ REM INITIALISATION OF THE BUS
140 REM SETTINGS OF PM2535
150 OUTPUT D ; "FNC VDC,RNG A,MSP 2,RSL 4,FIL ON,TRG B,OUT N"
160 OUTPUT D ; "MSR 1"                      @ REM MASKING PM2535 FOR SRQ
170 REM SETTINGS OF PM2120
180 OUTPUT D ; A$&"MO,OPEN 0-19"          @ REM MODE 0 ALL SWITCHES OPENED
190 CLEAR                                  @ REM CLEAR SCREEN
200 DISP "The results of 10 measurements with PM2120 and with SRQ." @ DISP
210 F=1
220 ON INTR 7 GOSUB 400                  @ REM MASKING THE CONTROLLER FOR SRQ
230 FOR N=1 TO 10
240 OUTPUT D ; A$&"CLOSE "&VAL$(N-1)      @ REM CLOSE NEXT SWITCH
250 IF N-1=0 THEN 260                      @ REM OPEN PREVIOUSLY CLOSED SWITCH
260 OUTPUT D ; A$&"OPEN "&VAL$(N-2)        @ REM START A MEASUREMENT
270 OUTPUT D ; "X"
280 WAIT 10
290 ENABLE INTR 7;8                      @ REM ENABLE THE BUS FOR SRQ
300 IF F=1 THEN 300                      @ REM WAIT FOR SRQ
310 F=1
320 NEXT N
330 DISP @ DISP "End of example 4."
340 END
400 REM SRQ ROUTINE
410 P=SPOLL(D)                           @ REM GET STATUS BYTE FROM PM2535
420 IF P AND 1<>1 THEN 460              @ REM IF THE SRQ HAS NOT BEEN
430 ENTER D ; I$                         GENERATED ACCORDING TO THE
440 DISP I$                               MASKING => RETURN
450 F=0
460 RETURN

```

**P3100**

```

100 'program "example 1 PM2534/35"
110 AD=7
120 DMM=710
130 SC=1
140 WR$="FNC VDC,RNG A,MSP 2,RSL 6,FIL ON,TRG B,OUT N" :settings PM2535
150 N=0
160 X$="X"
170 CALL IOINIT(AD,SC) :adapter number 7
180 TIME=10 :address of PM2535=10
190 CALL IOTIMEOUT(AD,TIME) :define system controller
200 NCHAR=LEN(WR$)
210 CALL IOOUTPUTS(DMM,WR$,NCHAR) :define length WR$
220 CLS :output to PM2535
230 PRINT "The results of 5 measurements" :clear screen
240 PRINT
250 PRINT
260 FOR N=1 TO 5 :5 measurements
270 XCHAR=LEN(X$)
280 CALL IOOUTPUTS(DMM,X$,XCHAR) :define length X$
290 MAX=50:RESULT$=SPACE$(MAX) :output to PM2535
300 ACTUAL=0 :define result buffer to 50 characters
310 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) :input from PM2535
320 PRINT LEFT$(RESULT$,ACTUAL) :print result without spaces
330 NEXT N
340 PRINT
350 PRINT "End of example"
360 END

```

```

100 'program "example 2 PM2534/35"
110 AD=7
120 DMM=710
130 SC=1
140 CALL IOINIT(AD,SC)
150 TIME=10
160 CALL IOTIMEOUT(AD,TIME)
170 WR$="TRG B,FNC VDC,RNG A,MSP 2,RSL 6,FIL ON,OUT N" :settings PM2535
180 NCHAR=LEN(WR$)
190 MSR$="MSR 1"
200 MCHAR=LEN(MSR$)
210 CALL IOOUTPUTS(DMM,WR$,NCHAR)
220 CALL IOOUTPUTS(DMM,MSR$,MCHAR)
230 CLS
240 PRINT "The result of 5 measurements with srq"
250 PRINT
260 X$="X" :define trigger on "x"
270 XCHAR=LEN(X$)
280 FOR N=1 TO 5
290 CALL IOOUTPUTS(DMM,X$,XCHAR) :output to PM2535
300 EVENT=1:STATUS=0 :enable srq:read srq
310 CALL IOWAIT(AD,EVENT,STATUS) :test on srq
320 RESPONSE=0
330 FOR S=1 TO 1000:NEXT :wait to show srq on dvm
340 CALL IOSPOLL(DMM,RESPONSE) :input status
350 IF RESPONSE AND 64 THEN PRINT "service request generated" :check on srq
360 MAX=50:RESULT$=SPACE$(MAX) :define result buffer to 50 cha
racters
370 ACTUAL=0
380 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) :input from PM2535
390 PRINT LEFT$(RESULT$,ACTUAL) :print result without spaces
400 NEXT
410 PRINT"end of example"
420 END
430 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) :input from PM2535
440 PRINT LEFT$(RESULT$,ACTUAL) :print result without spaces
450 NEXT N
460 PRINT
470 PRINT "End of example"
480 END

```

```

100 'program "example 3 PM2534/35 with PM2120"
110 AD=7
120 DMM=710
130 SC=1
140 WR$="FNC VDC,RNG A,MSP 2,RSL 6,FIL DN,TRG B,OUT N" :settings PM2535
150 AID$="AID 200;" :unit address 200
160 A$=AID$+"M0,OPEN 0-19" :a$=AID200;M0,OPEN 0-19
170 N=0
180 X$="X" :define trigger on "x"
190 CALL IOINIT(AD,SC) :initialise
200 TIME=10 :define 10s timeout
210 -CALL IOTIMEOUT(AD,TIME)
215 CLS
220 NCHAR=LEN(WR$) :define length WR$
250 CALL IOOUTPUTS(DMM,WR$,NCHAR) :output to PM2535
260 ACHAR=LEN(A$) :define length a$
270 CALL IOOUTPUTS(DMM,A$,ACHAR) :output to PM2120
290 PRINT "The results of 5 measurements" '
300 PRINT
-310 PRINT
320 FOR N=1 TO 5 :5 measurements
330 B$=AID$+"CLOSE"+STR$(N-1) :b$=AID 200;CLOSE N-1
340 BCHAR=LEN(B$) :define length b$
350 CALL IOOUTPUTS(DMM,B$,BCHAR) :output to PM2120
360 IF N=0 THEN 400
370 C$=AID$+"OPEN"+STR$(N-2) :c$=AID 200;OPEN N-2
380 CCHAR=LEN(C$) :define length c$
390 CALL IOOUTPUTS(DMM,C$,CHAR) :output to PM2120
400 XCHAR=LEN(X$) :define length X$
410 CALL IOOUTPUTS(DMM,X$,XCHAR) :output to PM2535
420 MAX=50:RESULT$=SPACE$(MAX) :define result buffer to 50 characters
430 ACTUAL=0
440 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) :input from PM2535
450 PRINT LEFT$(RESULT$,ACTUAL) :print result without spaces
460 NEXT N
470 PRINT
480 PRINT "End of example"
490 END

```

```

100 'program "example 4 PM2534/35 with PM2120 and srq from voltmeter"
110 AD=7 : 'adapter number 7
120 DMM=710 : 'address of PM2535=10
130 SC=1 : 'define system controller
140 CALL IOINIT(AD,SC) : 'initialise
150 TIME=10 : 'define 10s timeout
160 CALL IOTIMEOUT(AD,TIME)
170 WR$="TRG B,FNC VDC,RNG A,MSP 2,RSL 6,FIL ON,OUT N" : 'settings PM2535
180 AID$="AID 200;" : 'unit address 200
190 A$=AID$+"MO,OPEN 0-19" : 'a$=AID200;MO,opOPEN 0-19
200 NCHAR=LEN(WR$) : 'define length wr$
210 MSR$="MSR 1" : 'masking data available
220 MCHAR=LEN(MSR$) : 'define length msr$
230 CALL IOOUTPUTS(DMM,WR$,NCHAR) : 'output to PM2535
240 CALL IOOUTPUTS(DMM,MSR$,MCHAR) : ' '
250 ACHAR=LEN(A$) : 'define length a$
260 CALL IOOUTPUTS(DMM,A$,ACHAR) : 'clear screen
270 CLS
280 PRINT "The result of 5 measurements with srq"
290 PRINT
300 X$="X" : 'define trigger on "x"
310 XCHAR=LEN(X$) : 'define x$
320 FOR N=1 TO 5
330 B$=AID$+"CLOSE"+STR$(N-1) : 'b$=AID200;CLOSE N-1
340 BCHAR=LEN(B$) : 'DEFINE LENGTH B$
350 CALL IOOUTPUTS(DMM,B$,BCHAR) : 'output to PM2535
360 C$=AID$+"OPEN"+STR$(N-2) : 'c$=AID200;OPEN N-2
370 CCHAR=LEN(C$) : 'define length c$
380 CALL IOOUTPUTS(DMM,C$,CHAR) : 'output to PM2535
390 CALL IOOUTPUTS(DMM,X$,XCHAR) : 'output to PM2535
400 EVENT=1:STATUS=0 : 'enable srq:read srq
410 CALL IOWAIT(AD,EVENT,STATUS) : 'test on srq
420 RESPONSE=0
430 FOR S=1 TO 1000:NEXT : 'wait to show srq on dvm
440 CALL IOSPOLL(DMM,RESPONSE) : 'input status
450 IF RESPONSE AND 64 THEN PRINT "service request generated:check on srq"
460 MAX=50:RESULT$=SPACE$(MAX) : 'define result buffer to 50 characters
470 ACTUAL=0
480 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) : 'input from PM2535
490 PRINT LEFT$(RESULT$,ACTUAL) : 'print result without spaces
500 NEXT
510 PRINT"end of example"
520 END
530 CALL IOENTERS(DMM,RESULT$,MAX,ACTUAL) : 'input from PM2535
540 PRINT LEFT$(RESULT$,ACTUAL) : 'print result without spaces
550 NEXT N
560 PRINT
570 PRINT "End of example"
580 END

```

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Tel: 962-6-819929  
Fax: 962-2-823556  
TLX: 22161 jms jo

**Kenya**  
**Philips Kenya Ltd.**  
OI Kalou Road, Industrial Area  
PO Box 30554  
Nairobi  
Tel: 254-2-557999  
Fax: 254-2-543135  
TLX: 24033

**Korea, Republic of**  
**Myoung Corporation**  
(For Fluke products)  
Yeo Eui Do  
PO Box 14  
Seoul Korea  
Tel: (82) (2) 784-9942  
Fax: (82) 2-784-2387  
TLX: MYOUNG K24283

**South Korea**  
**Philips Industries (Korea) Ltd.**  
(For Philips products)  
CPO Box 3680, Philips House  
260-199, Itaewon-Dong  
Youngsan-Ku  
Seoul  
Tel: 82-2-7970378  
Fax: 82-2-7978048  
TLX: philkor k 27291

**Lebanon**  
**Electronic Supplies S.A.R.L.**  
Autostrade Dora, Hayek Bldg.  
PO Box 90 1388  
Beyrouth  
Tel: 01-894243  
TLX: 42950 DIC1

**Luxemburg**  
**Philips Luxembourg**  
**Professional Systems S.A.**  
Rue des Joncs 4  
L-1818 Howald  
Tel: 496111  
Fax: 400577  
TLX: 60572

**Malaysia**  
**Electronic Systems (Malaysia) Sdn. Bhd.**  
(For Philips products)  
Lot 51 Section 13  
Jalan University  
Petaling Jaya - Selangor 46200  
Tel: 60-3-7560112  
Fax: 60-3-7560761

**Mecomb Malaysia Sdn. Bhd.**  
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PO Box 24  
46700 Petaling Jaya  
Selangor, Malaysia  
Tel: (60) (3) 774-3422  
Fax: (60) 3-774 3414  
TLX: (784) MA37764 MECOMB

**Malta**  
**Charles A. Micallef & Co. Ltd.**  
PO Box 527  
217 St. Paul str.  
Valletta  
Tel: 356-234313/233506  
TLX: 1651 mica mw

**Mexico**  
**Mexicana de Electronica Industrial S.A. (Mixel)**  
Diagonal No. 27  
Entre Calle de Eugenia Y Ave.  
Colonia del Valle  
C.P. 03100, Mexico  
Tel: (90) (5) 680-4323  
Fax: (525) 687-8695  
TLX: (383) 177 1823 MDEIME

**Mixel Servicios en Computacion\***  
Instrumentation Y Perifericos  
Blvd. Adolfo Lopez Mateos No. 163  
Col. Mixcoac  
Mexico D.F.  
Tel: 90-5-563-5411

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**Measuretronix Ltd.**  
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 210231 Ramkhamhaeng Road  
 Bangkok 10240  
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 Tel: (66) (2) 375-2733  
 Fax: (66) 2-374-9965  
 TLX: (788) 82796 HUAMARK TH

**Tunisia**  
**S.T.I.E.T.**  
 32 bis rue Ben Ghedahem  
**Tunis**  
 Tel: 348666  
 TLX: 14512

**Turkey**  
**Türk Philips Ticaret A.S.**  
 Talatpasa Caddesi no. 5  
 PO Box 161  
 80640 Levent-Istanbul  
 Tel: 90-1-1792770  
 Fax: 90-1-1693094  
 TLX: 24192 phtr tr

**United Arab Emirates**  
**AI Sanani Trading Est.**  
 PO Box 7187  
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 Tel: 971-2-771370  
 Fax: 971-2-728963  
 TLX: 23966 Sanani em

**Haris Al-Afaq Ltd.**  
 PO Box 8141  
 Dubai, U.A.E.  
 Tel: 971-4-283625  
 TLX: 48168 Afaq em

**Uruguay**  
**Cossin Uruguaya S.A.**  
 (For Fluke products)  
 PO Box 1400  
 Libertad 2529  
 Montevideo, Uruguay  
 Tel: (598) (2) 789015  
 TLX: (398) 23010 COAUR UY

**Venezuela**  
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 (For Philips products)  
 Av. Francisco de Miranda  
 Urb. La Carlota,  
 Edf. Centro Empresarial Parque del Este  
 Apartado 1167  
 Caracas 1010-A  
 Tel: 58-2-203, 71111  
 Fax: 58-2-2391090  
 TLX: 25267 ivpsa vc

**Cossin C.A.**  
 (For Fluke products)  
 Calle 9 Con Calle 4, Edifl Edinurbi  
 Apartado de Correos NR-70.136  
 Los Ruices  
 Caracas 1070-A, Venezuela  
 Tel: (58) (2) 241-03-09  
 TLX: (395) 21027EMVEN VC

**Yemen Arab Republic**  
**Rashed Trading & Travel Agency**  
 Ali Abdulmugni st.  
 PO Box 1221  
 Sana'a, Yemen Arab Republic  
 Tel: 967-2-273231  
 TLX: 2230 abgbar ye

**Zaire**  
**Philips Electronics S.A.R.L.**  
 137 Boulevard du 30 Juin  
 BP 16636  
 Kinshasa  
 Tel: 31693  
 TLX: 21078 kinshasa

**Zambia**  
**Philips Electrical Zambia Ltd.**  
 Mwenbeshi Road  
 PO Box 31878  
 Lusaka  
 Tel: 218511/218701  
 TLX: za 41220

**Zimbabwe**  
**Philips Electrical (Pvt.) Ltd.**  
 62 Mutare Road  
 PO Box 994  
 Harare  
 Tel: 47211/48031  
 Fax: 263-4-47966  
 TLX: 2236

**For Countries not listed above:**  
**Philips Export B.V.**  
**I & E Export**  
**Test & Measurement**  
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 PO Box 218  
 5600 MD Eindhoven  
 The Netherlands  
 Tel: +31 40 711546  
 Fax: +31 40 711508  
 TLX 35000 phtc nl

**Fluke Int'l Corp.**  
 PO Box 9090  
 Mail Stop 206A  
 Everett, WA 98206-9090  
 Tel: 206-356-5500  
 Fax: (206) 356-5116  
 TLX: 185103 FLUKE UT

**Haris Al-Afaq Ltd.**

PO Box 8141

Dubai, U.A.E.

Tel: 971-4-283625

TLX: 48168 Afaq em

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 4920 Corporate Drive Suite J  
 Huntsville, AL 35805-6202  
 (205) 837-0581

**Arizona**  
**Phoenix**  
 2211 S. 48th Street Suite B  
 Tempe, AZ 85282  
 (602) 438-8314

**California**  
**Irvine\***  
 PO Box 19676  
 Irvine, CA 92713-9676  
 16969 Von Karman Ave.  
 Suite 100  
 Irvine, CA 92714  
 (714) 863-9031

**Northern\***  
 46610 Landing Parkway  
 Fremont, CA 94538  
 (415) 651-5112

**Colorado**  
**Denver\***  
 14180 E. Evans Ave.  
 Aurora, CO 80014  
 (303) 695-1000

**Connecticut**  
**Hartford**  
 Glen Lochen East  
 41-C New London Turnpike  
 Glastonbury, CT 06033  
 (203) 659-3541

**Florida**  
**Altamonte Springs\***  
 550 South Northlake Blvd.  
 Altamonte Springs,  
 FL 32803  
 (407) 331-4881

**Georgia**  
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 2700 Delk Road Suite 150  
 Marietta, GA 30067  
 (404) 953-4747

**Illinois**  
**Chicago\***  
 1150 W. Euclid Avenue  
 Palatine, IL 60067  
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**Indiana**  
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 8777 Purdue Road Suite 101  
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 (317) 875-7870

**Massachusetts**  
**Boston**  
 Middlesex Technology Center  
 900 Middlesex Turnpike  
 Building 8  
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**Maryland**  
**Rockville\***  
 5640 Fishers Lane  
 Rockville, MD 20852  
 (301) 770-1570

**Michigan**  
**Detroit**  
 45550 Helm Street  
 Plymouth, MI 48170  
 (313) 522-9140

**Minnesota**  
**Minneapolis**  
 1380 Corporate Center Curve  
 Suite 113  
 Eagan, MN 55121  
 (612) 854-5526

**Missouri**  
**St. Louis**  
 11756 Borman Drive Suite 160  
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 PO Box 930  
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 West 75 Century Road  
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 (201) 262-9550

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 4515 Culver Road  
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 (716) 323-1400

**North Carolina**  
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 1310 Beaman Place  
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 7271 Engle Road  
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 210231 Ramkhamhaeng Road  
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**Thailand**  
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 Tel: 348666  
 TLX: 14512

**Turkey**  
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 Tel: 31693  
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 Tel: 218511/218701  
 TLX: za 41220

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**Philips Electrical (Pvt.) Ltd.**  
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 PO Box 994  
 Harare  
 Tel: 47211/48031  
 Fax: 263-4-47966  
 TLX: 2236

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 Tel: +31 40 711546  
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**Phoenix**  
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 14180 E. Evans Ave.  
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 2700 Delk Road Suite 150  
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**Indiana**  
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**Massachusetts**  
**Boston**  
 Middlesex Technology Center  
 900 Middlesex Turnpike  
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 West 75 Century Road  
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**New York**  
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 4515 Culver Road  
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**North Carolina**  
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 1310 Beaman Place  
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