OPERATING INSTRUCTION

ECOmux 3 - ECOmux 4 - ECOmux 5

3 - 4 - 5 x Multiport Interface Digimatic + Opto-RS

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General

The ECOmux 5 interface makes it easy to connect up to 5 measuring devices with a Digimatic or Opto-RS interface. The ECOmux 4 supports up to 4 and the ECOmux 3 supports up to 3 measuring devices.The measured values are pulled from the measuring devices and transmitted to the PC, using the EUROmux data format.
The alternative communication protocols Mux10 and Mux50 can be set via commands.

The multiplexer has one USB and one RS232 interface for connection to the PC.
To use the USB port, a suitable driver must be installed on the PC. The FTDI FCT232 chipset is used. This is supported by current Windows versions by the Windows Update. However, we recommend installing the latest driver directly from the manufacturer:
http://www.ftdichip.com/Drivers/VCP.htm

For Windows, it is easiest to install the executable directly:

		Processor Architecture							
Operating System	Release Date	x86 (32-bit)	x64 (64-bit)	PPC	ARM	MIPSII	MIPSIV	SH4	Comments
Windows*	2016-06-23	2.12.18	2.12.18	-	-	-	-	-	WHQL Certified. Includes VCP and D2XX. Available as a setup executable Please read the Release Notes and Installation Guides.
Linux	2009-05-14	1.5.0	1.5.0	-	-	-	-	-	All FTDI devices now supported in Ubuntu 11.10, kernel 3.0.0-19 Refer to TN-101 if you need a custom VCP VID/PID in Linux

The parameters for the data transfer to the PC are:

- 9600 Baud, Noparity, 8 Bit, 1 Stop-Bit, no Handshake.
  Alternatively 1200 / 2400 / 4800 / 9600 / 19200 Baud can be set.

Using EUROmux protocol, the PC software can activate or deactivate each channel. After PowerON on, all channels are active.

By pressing the foot switch, a measured value is requested simultaneously from all activated channels.
The PC can also request measurements, either all channels with one command, or each channel individually.
Measured values from measuring devices that send automatically are accepted and automatically passed on to the PC, if the respective channel is activated.
The measured values are sent to the PC without a defined sequence. The response time of the connected measuring devices determines the order, the fastest first.

The measured values are transmitted in the EUROmux format; each measured value is marked with its channel number:
03MW +0015.982 means the meter on channel 3 sends the value +15.982

In the settings of the QS software packages, the EUROmux protocol is usually found under the name EUROmux or Brecht.

Technical specifications

Power Supply:
When connected via USB, the power supply is via USB, max current < 100mA
If the device is connected to the PC with RS232, a power supply is required. Supply 8 -24V DC, max. 100mA
Only use the original power supply unit belonging to the multiplexer (see accessories).
To connect the RS232, you need our Cable type “507”, see accessories.

Dimensions and weight:
Width 135mm x Height 54mm x Depht 175mm (excluding cables)
Weight: 0,5 kg
Housing Aluminium anodized, plastic frame with integrated rubber stands

Scope of delivery:
1 piece ECOmux, Version 3/4/5 channel as ordered
1 piece USB Cable A-B, 1,8m
1 piece Adaptorcable Opto-RS duplex

Connector:
RS232C interface to PC:
9-pin Sub-D jack on the back panel

Pin	Signal
3	TxD
2	RxD
5	0V

Standard settings: 9600 Baud, 1 Stop-Bit, 8 Bit per character.
The baud rate can be changed by means of a command.

Measuring connections 1 to 5:

It is possible to connect measuring devices with Digimatic or Opto-RS interface. An adaptor is required to connect the Opto-RS devices. Opto-RS Duplex and Opto-RS Simplex require different adaptors. 1 adaptor Opto-RS Duplex is included.

Power supply of measuring instruments:

The multiplexer does not supply the measuring devices. If necessary, the appropriate mains adapter or appliance-owned batteries must be used for the power supply of the measuring instruments.

EUROmux-Protocol:

Communication to the Multiplexer:

The following applies: The *number of the plug* equals the respective channel.
After Power On all channels and the foot switch are enabled.

Structure of data string:
Command<CR><LF>
Each line = command has to be completed with a Carriage Return (0x0D) + Linefeed (0x0A):

Responses and measured value transmissions from the multiplexer are terminated in the same manner with CR + LF.

Identification of the Multiplexer:

	command	string	description
I	Identification	I<CR><LF> $49 $D $A	Identification of communication protocol Response: BRECHT EUROMUX V3.0
i	Identification	i<CR><LF> $69 $D $A	Request Firmware version Response: ECOmux5 Vx.x

These commands can also be used to determine whether the multiplexer is connected and ready.

Request measured value:

	command	string	description
nn	single channel query nn = 01 - 99: channel number 2-digits	01<CR><LF> $30 $31 $D $A	Single channel query with channel number: Multiplexer responds with measured value output or timeout. No response is sent when the channels are deactivated.
00	Query all channels simultaneous	00<CR><LF> $30 $30 $D $A	Query all channels Multiplexer responds for each channel with measured value output or timeout. The measured values are sent to the PC without a defined sequence. The response time of the connected measuring devices determines the order, the fastest first. No response is sent when the channels are deactivated.

Format of measured values:

```
01MW_+1234.567CRLF
nnMW_SZZZZZZZZCRLF
| | ||    |   | |--  Line Feed $A
| | ||    |   |----  Return $D
| | ||    |--------  value 9 digits, floating point
| | ||               right aligned, filled up with „0“
| | ||-------------  prefixes "+" or "-"
| | |--------------  Space
| |----------------  MW ident of measured value
|------------------  channel number 00..99
```

Format Timeout message:

```
T0 999999.99 mmCRLF
```

Time-out error, this message is sent by the multiplexer if no response was received on the selected channel after expiration of the waiting time. Mitutoyo has set a waiting time of 2 seconds for the Digimatic interface.

Possible causes are:

- No device connected
- The device has turned itself off after a certain period of non-use
- Measuring device connection cable defective
- Meter battery empty

Channel-Activation and -Deactivation:

	command	string	description
Dnn	de-activate channel: nn 00 – 99 number of channel 2 digits	D01<CR><LF> $44 $30 $31 $D $A	Lock the specified channel number. With 00 all channels can be switched off at the same time. Deactivated channels are no longer considered for further queries. Values from self-sending measuring instruments are no longer passed on.
Enn	activate channel: nn 00 – 99 number of channel 2 digits	E00<CR><LF> $45 $30 $30 $D $A	Enable the specified channel number. With 00, all channels can be activated (enabled) at the same time.

Setting of communication protocol:

The protocol is set with the command P or p and a directly following number.
P1<CR><LF> The EUROmux protocol is active
P2<CR><LF> The MUX10 protocol is active
P3<CR><LF> The MUX50 protocol is active
The I and i commands return information on the set protocol.

Setting of Baud rate:

The baudxxxx command sets the baud rate, xxxx is the baud rate to be set.
Possible values are 1200, 2400, 4800, 9600 and 19200 baud
baud1200<CR><LF>
baud2400<CR><LF>
baud4800<CR><LF>
baud9600<CR><LF>
baud19200<CR><LF>

Additional commands:

ETX	$03	Software reset
O	$4F	Lock foot switch
L	$4C	Enable foot switch
F	$46	query foot switch Pressed button is noticed when the button function is disabled until readout takes place

Application hint:

Task: Continuous collection and display of values from the Multiplexer. Pressing the foot switch is to be recognized.

All commands to the Multiplexer have to be finished with „CR“. Only capital letters can be used.

1. Lock all channels: „D00“

2. Unlock channel. (e.g. 1): „E01“

3. Lock automatic transfer of data by pressing the Load-key: „O“

4. Request measuring value: „01“
   Multiplexer replies with a measuring value or with the Time-Out-Message.

5. Request status of Load- key (foot switch): „F“
   Multiplexer replies with „1“ when foot switch is pressed;
   if the foot switch has not been pressed, the reply is „0“

6. Further requests: see 4. End see 7

7. Lock channel: „D00“ or „D01“

8. Re-activate foot switch: „L“

Brief information about alternative protocols:

The protocols MUX10 and MUX50 were introduced by Mitutoyo many years ago. This is a short overview of the commands and data formats.
It always applies that each command must be completed with a CarriageReturn. The protocols are implemented as an extension on the EUROmux protocol. The EUROmux commands are available in parallel. The output string of the measured value is always protocol-specific.

MUX10-Protocol:

Commands to the multiplexer:

I	Output identification
X	Read channel number x
Dx	Lock channel number x
Ex	Release channel number x

Measured value output string:
01A + 123.4567 <CR>

First character:	always 0
Second character	channel number
3rd character	Measured value, always A
4th character	prefix + or -
5th - 12th character	Measured value with floating decimal point
13th character	Carriage Return

error messages:
E.g.: 921 <CR>

First character	with error always 9	
Second character:	channel number	
3rd character	Error code:	1 = No response from measuring device; 2 = Response can not be evaluated
4th character:	Carriage Return	

MUX50-Protocol:

Commands to the multiplexer:

I	Output identification
X	Read channel number x
Dx	Lock channel number x
Ex	Release channel number x

Measured value output string:

2␣MW␣+1234.567␣mm␣␣␣␣<CR><LF>

First character:	channel number
Second character	space
3 + 4th character	MW = measured value recognition; TO = Timeout, no response from measuring means
5th character	space
6th - 15th	character measured value with floating decimal point and prefix (+, -)
16th character	space
17th - 22th character	Unit (output always mm and space)
23th character	<CR> Carriage Return
24th character	<LF> Linefeed

In the event of an error message, the error value 999999.99 is output without a sign instead of the measured value: 2␣TO␣999999.99␣mm␣␣␣␣<CR><LF>

Accessories:

Connection cable 507:	Art # 10102
external power supply:	Art # 07591
Cable Opto-RS Duplex	Art # 10130

Contact data:

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