2.+4.+6. A123 - MFT-H-2/ENG
Operating Instructions MFT-H
Handy for MFT/MFT2 actuators

Products no longer available
Notes/Power supply

Safety notes on using the MFT-H

- When connecting-up to the actuator circuit, take great care not to allow the connecting lead to come into contact with mains power. Also ensure correct terminal assignment.
- The MFT-H is not isolated electrically from the RS232 interface or the actuator.
- Only approved computers that provide electrical isolation from the mains may be connected to the RS232 interface.
- Use only leak-proof alkaline batteries of Size AA (Mignon, LR6: dimensions 50x14 mm) or suitable NiCd or NiMH rechargeable batteries.
- All four units must be replaced at the same time when changing the batteries.
- Ensure correct polarity when fitting the batteries. Always use four identical batteries of the same make and type.
- Remove the batteries if the MFT-H is to remain unused for an extended period of time.
- The device contains no replaceable components apart from the batteries.

Fitting the batteries

1. Turn the MFT-H over to expose the back.
2. Open the battery compartment with a screwdriver or coin.
3. Fit the batteries in the compartment as indicated by the markers and close the compartment again.

Actuators parameterisable with MFT-H

All multifunctional and bus-capable actuators (MFT- / MFT2 actuators as well as the VAV compact NMV-D2M can be parameterised with the MFT-H. The damper actuator AM24-SR (multifunctional, but not bus-capable) can also be parameterised with the MFT-H.

What do ‘MFT’ and ‘MFT2’ mean?

MFT and MFT2 actuators employ Multi Function Technology and both types can be parameterised using the MFT-H Handy parameter assignment device. MFT(2) actuators can be controlled either conventionally or through the Belimo MP-Bus system. The actuator AM24-SR is not bus-capable. When used in a bus system each MFT / MFT2 actuator can also be linked to a sensor. The value provided by the sensor is acquired by the actuator and transferred to the MP-Bus system. MFT actuators can be linked to active sensors (DC 0-10 V output) and ON/OFF switches. MFT2 actuators can also be linked to passive resistance-type sensors (e.g. Pt 1000 devices). More information on sensor linking will be found in Product Information Document 2. + 6. MFT2-1.

Important: Assigning parameters to MFT(2) damper actuators

MFT(2) actuators (Multi-Function Technology) undergo basic parameter assignment for standard applications before being despatched from the factory. When necessary for his own purposes, the user can make on-site alterations to MFT(2) actuator parameters using the MFT Handy. However, when such reassignment of parameters is undertaken, the user will be responsible for ensuring that the settings are correct so as to provide proper functioning of the MFT(2) actuators. The final values of any new parameters should be marked on the MFT(2) actuators upon completion.
### Brief description MFT-H / Technical data

#### Operating controls

<table>
<thead>
<tr>
<th>Operating controls</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ON/OFF switch and display illumination</td>
<td>Press to toggle On and Off. Press for at least 2 s to illuminate display (MFT-H must be powered up first)</td>
</tr>
<tr>
<td>2. ESC Escape Key</td>
<td>Press briefly once to move back one level in the menu. Press for at least 2 s to return to the main menu</td>
</tr>
<tr>
<td>3. SET Memory Key</td>
<td>Jump to selected menu</td>
</tr>
<tr>
<td>4. Direction Keys</td>
<td>Enter selected command</td>
</tr>
<tr>
<td>5. Direction Keys</td>
<td>For moving the cursor to the next line or the previous line of the menu. When there are up to 3 selected steps per menu, the cursor will jump from line to line. When there are more than 3 selected steps it will scroll one line at a time each time a key is pressed. The longer the keys are held depressed the faster will be the scrolling. An audible signal is given when the last line of the menu is reached with the key pressed.</td>
</tr>
<tr>
<td>6. LCD Display</td>
<td>For selecting steps in the menus when there are several side-by-side. 4-line</td>
</tr>
<tr>
<td>7. RS232 connection</td>
<td>Level converter PP or MP to RS232</td>
</tr>
<tr>
<td>8. M</td>
<td>Software upgrade MFT-H</td>
</tr>
<tr>
<td>9. Connection to MFT(2) actuator</td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter assignment by MFT-H
MFT(2) actuators (Multi-Function Technology) undergo basic parameter assignment for standard applications before being dispatched from the factory. When necessary, on-site alterations can be made to MFT(2) actuator parameters using the MFT-H Parameter Assignment Device. The kind of functions that can be set depends on the type of MFT(2) actuator being used.

#### Checking service functions with the MFT-H
The MFT-H can be used for checking the functions of MFT(2) actuators. Either the values that have been previously assigned can be read out or the actuator itself can be operated with the MFT-H in order to check its functions.

#### Operating the MFT-H
No special knowledge of programming is needed. The device is used interactively by means of its 4-line display and keypad. The procedure is based on the menu method which guides the operator through the tree menu step-by-step. It almost completely eliminates any chance of making mistakes. In the various menus and sub-menus the operator can define the functions or parameters required. Implausible values will not be accepted by the MFT-H.

The language of communication to be used by the device can be preselected.

#### Technical data MFT-H

<table>
<thead>
<tr>
<th>Technical data</th>
<th>MFT-H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>4 ordinary Mignon alkaline batteries 1.5 V, AA Size, LR6 or rechargeable NiCd batteries can be used</td>
</tr>
<tr>
<td>Minimum voltage</td>
<td>An alarm appears on the display if the battery voltage falls below 4.2 V</td>
</tr>
<tr>
<td>Connections</td>
<td>• Power and PP/MP 3-pole motor plug-connector</td>
</tr>
<tr>
<td></td>
<td>• RS232 D-Sub 9 pole / female</td>
</tr>
<tr>
<td>Display</td>
<td>LCD 4-line</td>
</tr>
<tr>
<td>Communications</td>
<td>PP/MP</td>
</tr>
<tr>
<td>Safety class</td>
<td>(safety extra-low voltage)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>0 °C...+50 °C</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintenance-free</td>
</tr>
<tr>
<td>Case</td>
<td>ABS plastic (210 x 100 x 50 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>350 g</td>
</tr>
</tbody>
</table>

#### Accessories included MFT-H – SET
- 1 Special adapter with compression terminals, type MFT-C
- 1 Motor connecting lead, 2-pole with motor plug-connector and two 4 mm dia. plugs
- 1 Power pack 24 V, type ZN230-24
- 4 Mignon alkaline batteries
- 2 Sheets of labels with 48 stickers on each (Item No. 31720) incl. Waterproof felt-tip pen

Optional (Not included in the MFT-H - SET)
Motor plug-connector, 3-pole for customised connecting lead, Item No. 11783

#### Tree menu (principle)

- **Actuator**
- **Address**
- **MFT-H settings**
- **Addressing**
- **Default functions**
- **Modify**
- **Service**

**The MFT-H as level converter**
The MFT-H can be used as a level converter between RS 232 and PP interfaces (ZIP function).
Diagram 1
Typical application:
For assigning parameters to an MFT(2) actuator when it is already connected into the overall system. In this application the actuator is under analogue control through the Y-signal.

Notes:
• The MFT-H receives power from its own batteries.
• The MFT(2) actuator receives power from the overall system.
• The MFT(2) actuator is operable.
• As long as the U/PP terminal of the MFT(2) actuator is connected to the MFT-H, the feedback signal U5 will not correspond to the instantaneous actual value.

Diagram 2
Typical application:
For assigning parameters to an MFT(2) actuator before it is connected into the overall system. Suitable as well for assigning the same parameters to several MFT(2) actuators.

Notes:
• The MFT-H receives power from its own batteries.
• The MFT(2) actuator receives power from the MFT-H during parameter assignment.
• The MFT(2) actuator is only fully operable when it is receiving an external supply of power via the jack.
• Providing an external supply of power to the MFT(2) actuator via the special adapter greatly extends the life of the MFT-H batteries.

Diagram 3
Typical application:
For assigning parameters to an MFT(2) actuator when it is connected together with other actuators (up to a total of 8) via an MP-Bus system to a UK24LON unit. In this application the MFT(2) actuators are controlled digitally over the MP-Bus.

Notes:
• The MFT-H receives power from its own batteries.
• The MFT(2) actuators receive power via the UK24LON unit.
• Use the MFT-H to select MP addresses 1...8 in order to gain direct access to the required actuator.
Powering up/down

When an MFT-H Handy is powered up it is first initialised and the version of software with which it is loaded is displayed.

The subsequent behaviour of the Handy varies according to whether it is a first commissioning or a restart:

First power-up/First commissioning:
When a Handy is powered up for the first time it jumps directly to the “Language” menu after initialising. This allows the appropriate language of use to be selected.

Restart:
– on the same actuator:
When the Handy is powered up again it jumps to the same menu item that it was at before it was powered down, provided it is connected to the same actuator as before (i.e. the Serial No. and Address correspond).

– on a different actuator:
If a different actuator is connected to the Handy before it is powered up again the fault alarm “No actuator” appears on the display and an audible beep signal is given. If the actuator has already been addressed, enter the correct address under “Search” on the menu and the Handy will find the actuator in question. Otherwise it will first be necessary to assign an address to the actuator; see “Addressing”, Page ...

Auto power-down:
If, when a Handy is in use, none of its keys is pressed for a period of 5 minutes, it will power down automatically.

Fault alarms

Any faults that occur are always identified by an alarm on the display and also by an audible beep signal.

Alarms for exhausted batteries
When its batteries become exhausted (<4.2 V) the Handy generates an alarm on its display in the form of a flashing battery symbol. In order to avoid any loss of data the batteries must be replaced without delay.

If necessary, the alarm signal can be acknowledged with the (SET) key so that any parameter assignment task that has been started can be completed first. Although the status message will disappear from the display the battery symbol will continue flashing. If the batteries are not replaced the fault alarm will appear again as soon as the Handy is powered up again.

Communication and system fault alarms

<table>
<thead>
<tr>
<th>Message</th>
<th>Possible causes of faults</th>
<th>Fault rectification</th>
</tr>
</thead>
<tbody>
<tr>
<td>No actuator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No reply from actuator</td>
<td>Wiring error</td>
<td>• Check wiring</td>
</tr>
<tr>
<td>Defective transmission</td>
<td></td>
<td>• Check address</td>
</tr>
<tr>
<td>Programming error</td>
<td></td>
<td>• Repeat command</td>
</tr>
<tr>
<td>No EEPROM access</td>
<td>MFT(2) actuator defective</td>
<td>Change MFT(2) actuator</td>
</tr>
<tr>
<td>Command not recognised</td>
<td>MFT-H software version does not match that of the MFT(2) actuator</td>
<td>Ascertain software versions of MFT-H and MFT(2) actuator and consult Belimo</td>
</tr>
<tr>
<td>Enter password: ....</td>
<td>Input is password-protected</td>
<td>Enter password and start</td>
</tr>
<tr>
<td>Access denied</td>
<td>Belimo-barred input</td>
<td>Contact Belimo</td>
</tr>
</tbody>
</table>
Specific configuration table

According to the particular application each MFT(2) actuator has a specific configuration table and the corresponding preset values stored in its memory. This configuration determines which menu items in the MFT-H Handy can be selected and which values can be modified.

As soon as the Handy is connected to an MFT(2) actuator it downloads the data configuration from the actuator.

Four different tree-menus

For parameter assignment purposes there are four different tree-menus available for different groups of products which the user can turn to for assistance when he is parameterising a particular actuator.

<table>
<thead>
<tr>
<th>1</th>
<th>Tree-menu for parameterising MFT(2) damper actuators without a safety function</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM24-MFT(2)</td>
<td>AM24-MFT(2)</td>
</tr>
<tr>
<td>8 Nm</td>
<td>18 Nm</td>
</tr>
</tbody>
</table>

Tree-menu also valid for AM24-SR

<table>
<thead>
<tr>
<th>2</th>
<th>Tree-menu for parameterising MFT(2) damper actuators with a safety function</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF24-MFT(2)</td>
<td>AF24-MFT(2)</td>
</tr>
<tr>
<td>4 Nm</td>
<td>15 Nm</td>
</tr>
</tbody>
</table>

Tree-menu see page 8

<table>
<thead>
<tr>
<th>3</th>
<th>Tree-menu for parameterising MFT(2) valve actuators NV... without and NVF... with a safety function</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV24-MFT(2)</td>
<td>NVF24-MFT(2)</td>
</tr>
<tr>
<td>800 N</td>
<td>800 N</td>
</tr>
</tbody>
</table>

Tree-menu see page 9

<table>
<thead>
<tr>
<th>4</th>
<th>Tree-menu for parameterising VAV-Compact NMV-D2M</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMV-D2M</td>
<td></td>
</tr>
<tr>
<td>8 Nm</td>
<td></td>
</tr>
</tbody>
</table>

Tree-menu see page 10

Tree-menu see page 11
Tree menu for parameterising MFT(2) damper actuators with a safety function

- Actuator: Select MP-address 1–8. PP when only 1 actuator.
- Modify:
  - PWM (0.59–2.93s)
  - Actuator:
    - Operating time, active time, Stop/Go ratio
    - When the angle of rotation is limited mechanically the angle must be adapted electronically in order to ensure the proper functions
    - HW + SW direction of rotation changes produce virtual changes for switching points and Z control (= position settings are reversed)

- Description of individual functions:
  - pp. 12 & 13
  - page 15
  - page 16
  - page 17
  - page 18

Menu does not appear when "VAV (6 ± 4 V)" is selected under Basic Functions!
Products no longer available
Menu functions, A1 Default functions

In the Default functions branch of the tree menu it is possible to assign so-called ‘default’ or standard functions to MFT(2) actuators. For each default function a data record containing the normal standard parameters for the function is stored. The appropriate function can be selected with the \( \text{SET} \) key. Pressing the \( \text{SET} \) key enters the function into the actuator together with its data. A warning appears on the display first which must be acknowledged by pressing the \( \text{SET} \) key again.

A1.1 Default function SR (DC 2…10 V)
Selecting this function parameterises the MFT(2) actuator for the modulating mode.

A1.2 Default function PWM (0.59-2.93s)
Selecting this function parameterises the MFT(2) actuator for the PWM mode.

Examples of PWM control
When a PWM range of 0.59-2.93s has been selected for the actuator:

Example 1, 100% angle of rotation
When a pulse of 2.93s duration is sent to the actuator it causes it to move to the 100% angle-of-rotation position. (If the pulses sent to the actuator are of longer duration than 2.93 s the actuator will also move to the 100% angle-of-rotation position).

Example 2, 50% angle of rotation
When a pulse of 0.59s + (2.93s - 0.59s) / 2 = 1.17s + 0.59 s duration is sent to the actuator it causes it to move to the 50% angle-of-rotation position.

Example 3, 0% angle of rotation
When a pulse of 0.59 s duration is sent to the actuator it causes it to move to the 0% angle-of-rotation position. (If the pulses sent to the actuator are of shorter duration than 0.59s but longer duration than 20 ms the actuator will also move to the 0% angle-of-rotation position; at less than 20 ms there is no defined function).

Data record SR (DC 2…10 V) (Example AM24-MFT(2))
- Working range: 2…10 V DC
- Function Feedback: 2…10 V DC
- Torque: 18 Nm min.
- Angle of rotation: 95°
- Running time: 150 s
- Angle of rotation adaption: none

Data record PWM (0.59-2.93s) (Example AM24-MFT(2))
- Control signal Y PWM
- Working range: 0.59-2.93s
- Function Feedback: 2…10 V DC
- Torque: 18 Nm min.
- Angle of rotation: 95°
- Running time: 150 s
- Angle-of-rotation adaption: none

Explaining PWM control:
PWM does not mean ‘pulse width modulation’ in its normal sense. The actuator measures the length of the control pulse and then moves to the corresponding position. So far, PWM-type actuators are only being used in the USA. Depending on the type of actuator, the user can define various PWM ranges.
### A1.3 Default function 3-point
Selecting this function parameterises the MFT(2) actuator for the 3-point control mode.

<table>
<thead>
<tr>
<th>Default functions</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR(2-10V DC)</td>
<td></td>
</tr>
<tr>
<td>PWM(0.59-2.93s)</td>
<td></td>
</tr>
<tr>
<td>&gt;3-point</td>
<td></td>
</tr>
</tbody>
</table>

#### Wiring diagram 3-point

![Wiring diagram 3-point](image)

#### Data record 3-point (Example AM24-MFT(2))
- Control signal Y: 3-point
- Feedback U5: DC 2...10 V
- Torque: 18 Nm min.
- Angle of rotation: 95°
- Running time: 150 s
- Angle of rotation adaption: none

### A1.4 Default function Open/Close
Selecting this function parameterises the MFT(2) actuator for the Open/Close mode.

<table>
<thead>
<tr>
<th>Default functions</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWM(0.59-2.93s)</td>
<td></td>
</tr>
<tr>
<td>&gt;3-point</td>
<td></td>
</tr>
</tbody>
</table>

#### Wiring diagram Open/Close

![Wiring diagram Open/Close](image)

#### Data record Open/Close (Example AM24-MFT(2))
- Control signal Y: Open/Close
- Feedback U5: DC 2...10 V
- Torque: 18 Nm min.
- Angle of rotation: 95°
- Running time: 150 s
- Angle of rotation adaption: none

### A1.5 Default function VAV (6 ± 4V)
Selecting this function parameterises the MFT(2) actuator for the VAV control mode.

<table>
<thead>
<tr>
<th>Default functions</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open/Close</td>
<td></td>
</tr>
<tr>
<td>&gt;VAV (6±4V)</td>
<td></td>
</tr>
</tbody>
</table>

#### Wiring diagram VAV

![Wiring diagram VAV](image)

#### Data record VAV (6±4V) (Example AM24-MFT(2))
- Control signal Y: From VAV controller
- Function: From VAV controller
- Feedback U5: DC 2...10 V
- Torque: 18 Nm min.
- Angle of rotation: 95°
- Running time: 150 s
- Angle of rotation adaption: none

### Notes
Products no longer available.
The **Modify** branch of the tree menu allows the values and functions of an MFT(2) actuator to be custom-parameterised when necessary (see p. 21 Example of parameter assignment).

When the **Modify** branch of the menu is first entered it will always show the values and functions that were given to an MFT(2) actuator the last time it was assigned parameters. If a modification of a particular default function (A1.x) only involves changing a few individual values from their default settings, it is advisable to load the MFT(2) actuator with the appropriate default function (see page 12) before making the modification.

### A2.1 Control

**Control** allows appropriate working ranges to be defined for control modes.

#### A2.1.1 Selection of modulating control: The settings correspond to the electrical working range for 0...100% angle of rotation or stroke, in the case of VAV-Compact NMV-D2M = 0...100% nominal volumetric flow ($V_{nom}$) effect on working range if MAX and/or MIN positions (see Page 16, A2.3.4) are selected. The working range corresponds to the control range set with the MIN and MAX positions. The set MIN position corresponds to the Start point of the working range. The set MAX position corresponds to the Finish point of the working range. (For the VAV-Compact NMV-D2M the MIN position corresponds to the minimum volumetric flow $V_{MIN}$ and the MAX position to the maximum volumetric flow $V_{MAX}$)

- **A2.1.1a** Selection of a fixed working range DC 2...10 V (as per SR (DC 2-10 V) see page 12, Section A1.1)
- **A2.1.1b** Selection of a fixed working range DC 0.5...10 V
- **A2.1.1c** Variable definition of a working range:
  - Start DC 0.5...30.0 V; Finish DC 2.5...32.0 V
  - For the VAV-Compact NMV-D2M: Start point DC 0...30.0 V and Finish point DC 2.0...32.0 V
  - Finish must be at least 2 V above Start!

#### A2.1.2 Selection of PWM control (MFT(2) actuator parameterised for PWM control) (see page 12, A1.2 Explaining PWM control)

- **A2.1.2a** Selection of a fixed PWM working range of 0.02...5s
- **A2.1.2b** Selection of a fixed PWM working range of 0.59...2.93s
- **A2.1.2c** Selection of a fixed PWM working range of 0.1...25.5
- **A2.1.2d** Variable definition of a PWM working range:
  - PWMmin. 0.02 s...... PWMmax. 50.00 s

#### A2.1.3 Selection of 3-point control. MFT(2) actuator parameterised with data record for 3-point actuator (see page 13, Section A1.3)

- **A2.1.3a** Selection of a fixed PWM working range

#### A2.1.4 Selection of Open/Close control. MFT(2) actuator parameterised with data record for Open/Close actuator (see page 13, Section A1.4)

The mode of control required is selected with the direction keys $\uparrow \downarrow$ and a variable working range with the direction keys $\leftarrow \rightarrow$ and $\leftarrow \rightarrow$. Pressing the **SET** key either causes the menu to jump to the next sub-menu or the selected values are entered into the actuator.
A2.2 Feedback

The Feedback branch of the tree menu allows the function of the feedback signal to be defined.

A2.2.1 Selection of feedback signal U₅ as a modulating linear DC measured voltage: The defined signals correspond to 0...100% angle of rotation or stroke. For the NMV-D2M the signals correspond to the actual value of volumetric flow referred to VNENN.

- **A2.2.1a** Select a fixed range of DC 2...10 V
- **A2.2.1b** Select a fixed range of DC 0.5...10 V
- **A2.2.1c** Variable definition of the DC measuring voltage signal:
  - Start DC 0.5...8.0 V; Finish DC 2.5...10.0 V
  - For the VAV-Compact NMV-D2M: Start point DC 0...8.0 V and Finish point DC 2.0...10.0 V
  - Finish must be at least 2 V above Start!

A2.2.2 Select feedback signal U₅ as softswitches S₁ and S₂. Referred to the effective mechanical angle of rotation or stroke of the MFT(2) actuator, it is possible to define 2 soft switching points (S₁ and S₂). The level of the DC voltage of U₅ varies according to the angle of rotation or stroke executed and the S₁ or S₂ switching points reached.

- Actuator position above set value of S₁ and below set value of S₂: Level U₅ = constant DC 7 V
- Actuator position below set value of S₁: Level U₅ = constant DC 4 V
- Actuator position above set value of S₂: Level U₅ = constant DC 10 V

A2.2.3 Assign maintenance or fault alarms to feedback signal U₅. Various criteria that output a maintenance or fault alarm on U₅ can be defined. Depending on whether maintenance or fault has been defined for the criteria A2.2.3a - A2.2.3d, U₅ outputs a specific signal when one of the criteria occurs.

- A2.2.3a - Criterion **actuator hunting** (typical cause: unstable control) selectable as maintenance or fault alarm. **Stop/Go-ratio** is the ratio [%] of active time to operating time (operating time = No. of hours actuator connected to power supply). Active time = No. of hours MFT(2) actuator in mechanical motion while connected to power supply. A maintenance or fault alarm is generated if the **Stop/Go-ratio** exceeds a value of 20% (see also explanations on page 18, Section A3.5 Data log)

- A2.2.3b - Criterion **mechanical overload** (actuator stationary) selectable as maintenance or fault alarm.

- A2.2.3c - Criterion **mechanical travel changed 10%** selectable as maintenance or fault alarm.

- A2.2.3d - Combination of maintenance or fault alarms A2.2.3a – A2.2.3d and modulating DC measuring voltages A2.2.1a – A2.2.1b selectable. If a maintenance or fault alarm criterion is exceeded, the DC measuring voltage signal for the maintenance or fault signal are overridden.

A2.2.4 Combination of maintenance or fault alarms A2.2.3a – A2.2.3c and softswitches S₁ and S₂ A2.2.2a – A2.2.2b selectable. If a maintenance or fault alarm criterion is exceeded, the softswitch signals for the maintenance or fault signal are overridden.

The feedback function required is selected with the directions keys and variable values are set with the direction keys and . Pressing the key either causes the menu to jump to the next sub-menu or the selected values are entered into the actuator.

Vers. 2.0
Menu functions, A2 Modify

**A2.3** The Motion branch of the tree menu allows the motion, running time and angle-of-rotation or stroke functions of the MFT(2) actuator to be defined.

### A2.3.1 Select the torque or force of the MFT(2) actuator (not possible in the case of MFT(2) actuators with springs)

- **A2.3.1a** Set torque or force to 100% default value. Example: AM24-MFT(2) = 18 Nm
- **A2.3.1b** Set torque or force to 75% of default value. Example: AM24-MFT(2) = 13.5 Nm
- **A2.3.1c** Set torque or force to 50% of default value. Example: AM24-MFT(2) = 9 Nm
- **A2.3.1d** Set torque or force to 25% of default value. Example: AM24-MFT(2) = 4.5 Nm

### A2.3.2 Select running time of MFT(2) actuator

- **A2.3.2a** Set running time for 100% angle of rotation or stroke as default value. Example: AM24-MFT(2) = 150 s
- **A2.3.2b** Set running time for 100% angle of rotation or stroke anywhere within a range determined.

**Note:** The torque [Nm] and sound power level [dB] of the MFT(2) actuator might vary if the running time is less than the default value. Refer to the appropriate function graphs in the product information on MFT(2) actuators. The adjustable range of running time depends of the connected MFT(2) actuator.

### A2.3.3 Select the direction of rotation or lift of the MFT(2) actuator.

- **A2.3.3a** Set the direction of rotation or lift according to the symbols on the direction-of-rotation switch on the housing of the MFT(2) actuator or the settings of DIL switch S3.2 (closing point) on the linear actuator.
- **A2.3.3b** Set the direction of rotation or lift opposite to the selected direction of rotation of the damper actuator or to the selected closing point of the linear actuator.

### A2.3.4 Adaption

- For damper actuators and valve actuators select override positions and/or angle-of-rotation or stroke limits.
- For the VAV-Compact NMV-D2M select override positions and volumetric flow limits.

**Note:** In the case of the AM24-SR and their configuration variants AM24-0xx the MIN position is referred to 0...100% angle of rotation.

### A2.3.5 Select adaption (during adaption the measuring signal U5 is automatically adapted to the effective value of mechanical angle of rotation. The working range and the running time are adapted to the control range set with MIN and MAX).

- **A2.3.5a** No adaption (default)
- **A2.3.5b** To trigger adaption • NM24-MFT(2), AM24-MFT(2), GM24-MFT(2) and NMV-D2M by pressing the manual pushbutton twice. • LF24-MFT(2) and AF24-MFT(2) by moving the L/R switch back and forth twice.
- **A2.3.5c** Adaption triggered: Each power-up or when the functions described in A2.3.5b are implemented.

The functions required are selected with the directions keys ▶◁ and the variable values are set with the direction keys ▶◁. Pressing the SET key either causes the menu to jump to the next sub-menu or the selected values are entered into the actuator.

**Vers. 2.0**

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Products no longer available
A2.4 Copy

Copy data record from one MFT(2) actuator to another.

Typical applications:
- Replacing a mechanically defective MFT(2) actuator with a new unit
- Assigning parameters to a small series of actuators

Copying procedure:
1. Connect the MFT-H device to the MFT(2) actuator from which the data is to be taken.
2. Use the "Enter original copy" function on the MFT-H device to transfer the data from the actuator to the device.
3. Disconnect the MFT-H device from the first actuator and connect it to the next actuator.
4. Use the "Copy" function on the MFT-H device to enter the data into the next actuator.

Important:
The duplicating function can only be used if the type and the actuator configuration table are identical in both the original and the copy, otherwise a fault alarm will be given.

A2.5 Reset

Reset any entry already verified with the SET key.

A2.5.1 Reset the last entry verified with the SET key.

A2.5.2 Reset all entries verified with the SET key since the last power-up of the MFT-H device.

In the case of VAV-Compact (NMV-D2M) resets $V_{MIN}$, $V_{ZS}$ and $V_{MAX}$ to the settings that were stored in the unit when it was delivered.

The functions required are selected with the directions keys $\uparrow \downarrow \leftarrow \rightarrow$. Pressing the SET key either causes the menu to jump to the next sub-menu or the selected functions are initiated.
**Menu functions, A3 Servie**

**A3.1 Identification of the MFT(2) actuator.**
A3.1.1 Read out the Serial No. of the MFT(2) actuator.
A3.1.2 Read out the Type / Software version of the MFT(2) actuator.
A3.1.3 Display the plant site string (is available, otherwise no function).

**A3.2 The actuator position as a percentage of the effective value of angle of rotation or stroke (actual volumetric flow as a percentage of the nominal volumetric flow in the case of the VAV-Compact NMV-D2M) can be compared with the reference value.** It is important to take into account that, in the case of electronically limited angles of rotation (or limited volumetric flow with the NMV-D2M), i.e. set with MIN and MAX positions – see Page 16, para. A2.3.4 – the working range of the actuator depends on the set values of MIN and MAX (V_MIN and V_MAX) with the NMV-D2M. The START point of the working range is at the MIN position and the FINISH point at the MAX position (V_MIN and V_MAX) in the case of the NMV-D2M. In addition, it is important to take into account that the MIN position is referred to the MAX position (V_MIN and V_MAX) in the case of the NMV-D2M.

**A3.3 Initiate angle-of-rotation adaption.** Adaption can be initiated by pressing the SET key. The MFT-H display verifies the initation with the message "Adaption in progress." During adaption, the actuator runs automatically to both end positions. It adapts the US feedback signal to the effective mechanical angle of rotation. The running time and the working range are adapted to the control range defined by MIN and MAX.

**A3.4 Display the actual parameters of the MFT(2) actuator (actual data record).** Function: Use the direction keys \( \leftarrow \rightarrow \) to move one display line forward or back. When a line contains several parameters (e.g. various defined maintenance alarms, see page 15), the MFT-H device scrolls automatically after a few seconds.

**A3.5 Display Operating time \([h]\), Active time \([h]\) and Stop/Go-ratio \([\text{ratio of active time to operating time}]\).**

Operating time = No. of hours actuator powered up.

Active time = No. of hours actuator powered up and moving.

Stop/Go-ratio = Ratio [\%] of active time to operating time (calculate thus: active time \([h]\) / operating time \([h]\) \times 100) Example: An operating time of 100,000 h and an active time of 10,000 h gives a Stop/Go-ratio of 10\%. If the Stop/Go-ratio is relatively high it might be due to unstable control triggering the actuator. Page 15 (A2.2.3a) describes how the Stop/Go-ratio can be defined as a criterion for maintenance and fault alarms. Use the direction keys \( \leftarrow \rightarrow \) to move between operating time, active time and Stop/Go-ratio in the menu.

**A3.6 Display maintenance and fault alarms generated by the actuator.** Whenever there are several alarms present, they can be displayed in succession by pressing the direction keys \( \leftarrow \rightarrow \). Individual alarms can be cancelled by pressing the SET key. The message No alarms is displayed if there are no alarms present.

**A3.7 A simple GO/NO GO – test for functional testing.**
1. When the menu is selected a reference value corresponding to the preset MAX position is issued to the actuator by the Handy (default for MAX is 100\%). The actuator continues running until it reaches the preset reference value.
2. When the SET key is pressed the Handy issues the actuator with a reference value which corresponds to the preset MIN position (default for MIN is 0\%). The actuator continues running until it reaches the preset reference value.
3. The next time the SET key is pressed the Handy issues the actuator with a reference value which corresponds to the preset MAX position defined by MIN and MAX. (The value is 50\% of the control range defined by MIN and MAX positions are set to default). The actuator continues running until it reaches the preset reference value.

**A3.8 Response sensitivity and reversal hysteresis are adjustable so that MFT(2) actuators do not respond to every oscillatory movement of the control signal. The service life of the equipment can be enhanced by a correct choice of these values. The values are defined as degrees of angle of rotation in the case of rotary actuators and as mm in the case of linear actuators. The values correspond to the amount by which the control signal must be changed in order to change the position of the actuator.**

**A3.8.1 Response sensitivity set to 1 degree (rotary actuators) or to 0.2 mm (linear actuators).**
Reversal hysteresis set to 2.5 degrees (rotary actuators) or to 0.5 mm (linear actuators).

**A3.8.2 Settings for sensitive equipment: Reversal hysteresis set to 5.0 degrees (rotary actuators) or to 1.0 mm (linear actuators).**

**A3.9 Definition of Default position (synchronisation).**
A3.9.1 At initial commissioning, when the pushbutton is pressed, the actuator runs to default position 1 or 2 depending on the direction of rotation selected (see Table).
A3.9.2 At each power-up (also after a power failure) the actuator runs to default position 3 or 4 depending on the direction of rotation selected (see Table).
A3.9.3 At each power-up (also after a power failure) the actuator runs to default position 5 or 6 depending on the direction of rotation selected (see Table).

The functions required are selected with the direction keys \( \uparrow \downarrow \) and \( \leftarrow \rightarrow \). Pressing the SET key either causes the menu to jump to the next sub-menu or actuator data can be displayed, deleted or entered into the actuator.
Various modes of operation can be selected from the MFT-H settings branch of the tree menu.

**E1** MFT-H language of communication

- **E1.1** Select German
- **E1.1** Select English
- **E1.3-** E1.10 currently in preparation

**E2** MFT-H device in PP-Interface mode

When the MFT-H device is switched to this mode, the display shows the message "PP-Interface ready...". The MFT-H can now be used as a level converter between an RS232 interface and a PP interface (ZIP function).

**E3** Display of Software version loaded in MFT-H device

The functions required are selected with the direction keys \[\uparrow \downarrow \leftarrow \rightarrow\] and the variable values set with the directions keys \[\uparrow \downarrow \leftarrow \rightarrow\]. Pressing the \[\text{SET}\] key either causes the menu to jump to the next sub-menu or the selected values are entered into the actuator.
The address of the actuator is entered in the **Addressing** branch of the menu.

### Either PP or 1...8 (MP addresses) can be selected in the “Address” menu.

- **The PP address (PP = Point-to-Point) is selected** if there is only one MFT(2) actuator connected to the Handy (see Diagram 1 or Diagram 2 on Page 5). When an actuator is addressed with PP it is automatically parameterised for the classic mode of operation (no MP-Bus). In this case its control in the classic mode can be either modulating, 3-point, Open/Close or PWM. PP addressing is also used to reset an actuator that has previously been set for bus operation to the classic mode.

- **MP addresses 1...8 (MP = Multi Point) is selected** if there are several MFT(2) actuators connected to the Handy via the MP-Bus (see Diagram 3 on Page 5). This is because when there are several MFT(2) actuators communicating over the MP-Bus each one must be clearly identifiable.

### Procedure for addressing an MFT(2) actuator:

1. Preselect the required address with the \[\text{Y} \quad \text{A}\] keys (Example: MP address 4)

```
Addressing
>Addressing: 4
ESC = Abort
```

2. Press the \[\text{SET}\] key and the following display will appear...

```
Addressing
Unlatch actuator
ESC = Abort
```

3. Perform the appropriate reset function on the MFT(2) actuator from the table below and according to what the Handy demands.

<table>
<thead>
<tr>
<th>Actuator family</th>
<th>Actuator type</th>
<th>Reset function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuators without spring return</td>
<td>NM24-MFT(2), AM24-MFT(2), GM24-MFT(2), NMV-D2M</td>
<td>Press manual pushbutton 1x</td>
</tr>
<tr>
<td>Actuators with spring return</td>
<td>LF24-MFT(2), AF24-MFT(2)</td>
<td>Move L/R switch back and forth 1x (within 4 s)</td>
</tr>
<tr>
<td>Linear actuators for valves</td>
<td>NV24-MFT(2), NVF24-MFT(2), NVF24-MFT(2)-E</td>
<td>Press key S2 1x (inside the housing cover)</td>
</tr>
</tbody>
</table>

4. The following display appears briefly to show that the appropriate address has been assigned to the MFT(2) actuator:

```
Actuator programmed…
```

The required address will have been assigned to the actuator when this procedure has been completed.

### Notes on parameterising AM24-SR’s

The AM24-SR and its configuration variants AM24-xx (e.g. AM24-001) do not have a bus capability and so cannot be addressed. In order to set their parameters these types can be accessed directly via the Actuator/Address menu. In this case “PP” must be selected as the address.
Examples of parameter assignment

Starting point for the examples of parameter assignment

- When the MFT-H device is powered up, it always jumps directly to the menu step that was selected when it was powered down. In the following Examples, parameter assignment always begins in the main menu. Press the **ESC** key for at least 2 seconds in order to access the main menu.
- During parameter assignment, the MFT(2) actuator must be connected to the MFT-H device as shown in Diagrams 1 or 2 (see page 5).

### 1. Example: Parameterising an SRS function with a AM24-MFT(2) actuator

#### 1.1 Preparation

**a) Definition of required parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working range DC</td>
<td>3.5...6.6 V</td>
</tr>
<tr>
<td>Feedback US DC</td>
<td>2...10 V</td>
</tr>
<tr>
<td>Torque DC Nm</td>
<td>18</td>
</tr>
<tr>
<td>Angle of rotation °/s</td>
<td>90</td>
</tr>
<tr>
<td>Running time s</td>
<td>150</td>
</tr>
<tr>
<td>Overides DC</td>
<td>min. Max. Pos. (Ref. to full) = 50%</td>
</tr>
<tr>
<td>Angle of rotation adaption</td>
<td>none</td>
</tr>
</tbody>
</table>

**b) Ascertain default function nearest to the final parameterising required.**

To ascertain: The above data record is nearest to the default function SR (2...10 V DC). Therefore, the SR default function and the SR wiring diagram shown on page 12, Section A1.1 can be used as the basis.

#### 1.2 Parameter assignment

**a) Select menu**

Press the **ESC** for 2 seconds.

**b) Select Actuator menu**

Press the **SET** key.

**c) Select Default functions menu**

Press the **SET** key.

**d) Load default function SR (DC 2...10 V) into the MFT damper actuator.**

Press the **SET** key.

**e) Select Modify menu**

Press the **ESC** key.

**f) Select Control menu**

Press the **SET** key.

**g) Select Control signal DCV menu**

Press the **SET** key.

**h) Selected DC variable menu**

Press the **SET** key twice until the cursor is opposite DC variable.

**i) Program SRS range**

Hold the **ESC** key depressed until Start shows 3.5 V.

**j) Labelling:** Upon completion of programming, attach a label to the MFT(2) actuator showing the customised data (not identical to the AM24-SR basic type).

A waterproof felt-tip pen will write on the special stickers provided (use 2 stickers if necessary).

**Data record parameterised**
Instructions for a Handy software upgrade

Before a software upgrade can be carried out a binary file containing the whole menu and the languages (Version 2.0 has German and English only, other languages are in preparation) must be loaded into the Handy. Use the “download20.exe” download program for this purpose.

The program can be started directly from the floppy disk (1.44 MB) or the hard disk.

System requirements and accessories needed:
- PC with Windows 95/98/NT/2000 and at least 8 MB of RAM
- Available serial interface COM1 or COM2
- Mouse for operating the software
- RS232 lead, for monitors, D-Sub 9-pin, male/female (no core crossing)

Procedure for upgrading MFT-H Handy’s:
Remove the red cap from the interface connector on the Handy and use the 9-pin D-Sub lead to connect to one of the PC’s serial interfaces COM1 or COM2.
Start the download program download20.exe from the hard disk or floppy and activate the appropriate interface, e.g. COM2.

In the menu, click on [Download] [Load file] or [1] and ....

....open the binary file, e.g. <<mft-h-v20.bin>>

The file will have been loaded successfully if the <<ready to program>> message appears.
Preparing the Handy
Switch on the Handy and wait until it has finished its startup cycle (first-time Handy’s jump to [Language] in the menu.

Select [MFT-H settings] in the menu and change to the [Software] menu.

Pressing all 4 arrow keys on the Handy at the same time for at least two seconds will cause the display to change to the hidden menu [SW Upgrade].

Select [Execute].
Note: Activating “Execute” deletes the old software immediately. This means that the Handy can no longer be used until the new software has been loaded.

Loading a Handy with its new software
The message below and a flashing arrow (bottom right) indicate that the Handy is ready for the software download.

Download is started by using the mouse to click on [Download] and then [Start] or . Download status is indicated at ‘Progress’ by means of a moving bar. While this function is in progress a solid square in the bottom right-hand corner of the Handy display will be flashing. Wait until the following status message appears (this may take a few minutes):

The Handy has now been successfully upgraded. It will then restart, give a single short beep and change to the Start Menu.

Programming other Handy’s
If there are other Handy’s to be upgraded with new software simply plug in the next one with the RS232 lead and proceed again as described above.

Errors during upgrading
Should downloading be impossible for any reason the following status message will appear on the display:

Check the following points:
• Is there a proper connection between the Handy and the appropriate serial interface COM1 or COM2?
• Are you sure there is really no core crossing in the RS232 lead?
• Is the Handy switched on and in SW Upgrade mode? (Is the arrow in the bottom right-hand corner of the display flashing?)

If everything appears to be OK, click on [Start] in the [Download] menu again. If it still does not work, switch the Handy off and on again, close the download software on the PC and restart it.
Innovations, Quality, and Consultancy: A partnership for motorizing HVAC actuators

Products no longer available

Air applications

- Safety actuators for motorizing fire and smoke extraction dampers
- VAV systems for individual room air control

Water applications

- Mixing actuators and motorized ball valves for HVAC water circuits
- Globe valves and intelligent linear actuators – also for leading makes of valve