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Manual

Standard Coupling Unit
700 - 6000 MHz

SCF-0600-6G

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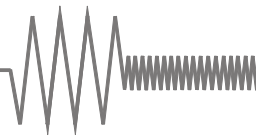
Manual
Coupling Unit SCF-0600-6G

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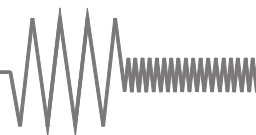...

Released: M. Demharter

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....

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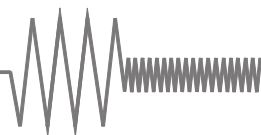
Alteration Chart

Release no.	Version	Unit state	Description of changes	Date	Editor
1	1.0	00	first edition	03 November 2017	Demharter
2	1.1	00	first revised edition chapter 2.2.1 inserted STR and STV inserted	20 February 2018	Demharter
3	1.2	01	changed unit state	21 February 2018	Osenberg
4	2.0	01	New ISO declaration at bottom line integrated	04 June 2019	Osenberg
4	3.0	01	STX and ETX described for firmware V2.3 and higher	27 April 2020	Demharter
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Contents   Page

1 GENERAL

1.1 General description

This manual describes the Coupling Units named "SCF-0600-6G" unit state 01 and higher (firmware V2.3 and higher)..

The Coupling Unit consists of seven-segment displays, UP/DOWN-keys, a power supply, a control card as well as hybrid couplers, variable semiconductor attenuators and LEDs for input power level indication.

The control card BK-AVR2560 interprets the commands from the manual control, the RS-232-interface, the LAN-interface and the USB-interface and controls the attenuators and the power level indications.

1.2 Delivered parts

- Coupling Unit

- Power cable

- Operating manual on CD

1.3 Safety precautions

During operation of the unit the general safety precautions according to VDE 0100, VDE 0800 and VDE 0805 are to be obeyed.

Attention: In order to avoid touching the voltage loaded parts, **d o   n o t   o p e n** the unit!

Repairs of the device are permitted to authorized personal only. It is absolutely forbidden to use defective units!

The device must be grounded at all times!

1.4 Components of the front panel

1 RF-connections of one hybrid-coupler
2 RF-connections (OUT single or coupled Nodes)
3 Power level indicators
4 Seven-segment displays
5 UP/DOWN-keys for the variable attenuators
6 Power switch S1 for 230V AC-supply with integrated control lamp
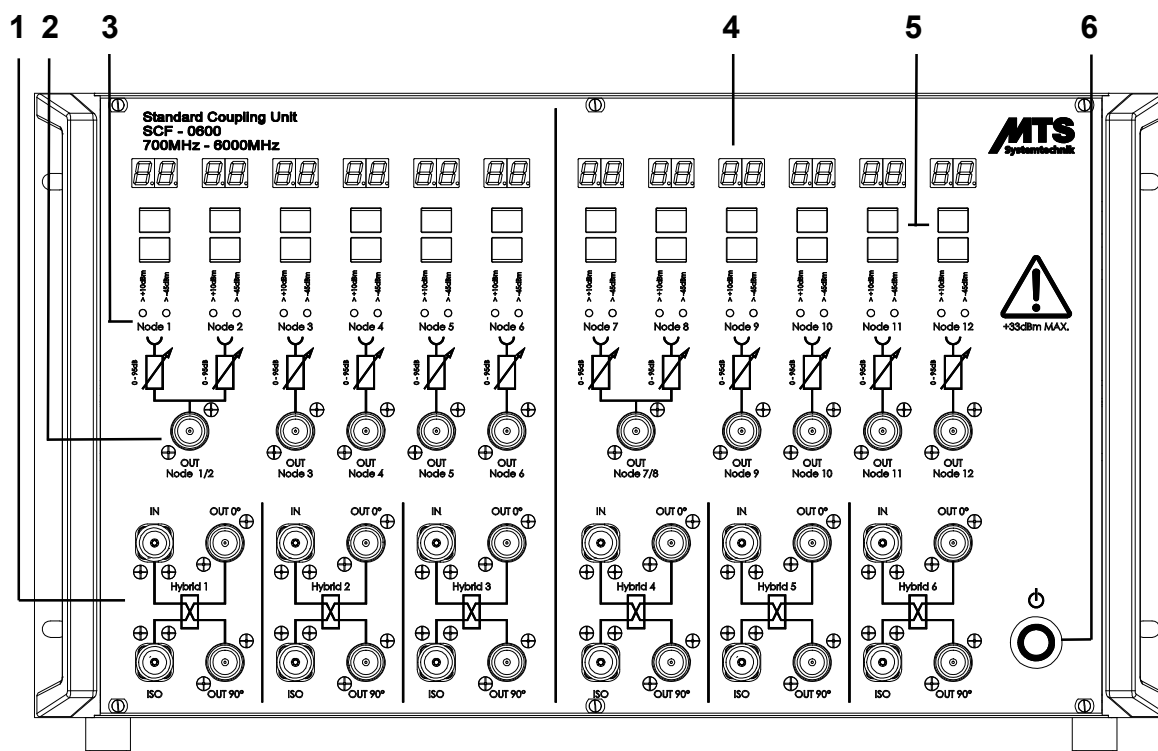
Illustration 1: Front view SCF-0600-6G

1.5 Components of the rear panel

1	Appliance plug with integrated fuses F1 and F2
2	Ground connector (optional)
3	RF-connections of Node 1 – 12
4	Control card with RS-232-interface
5	LAN-interface
6	USB-interface

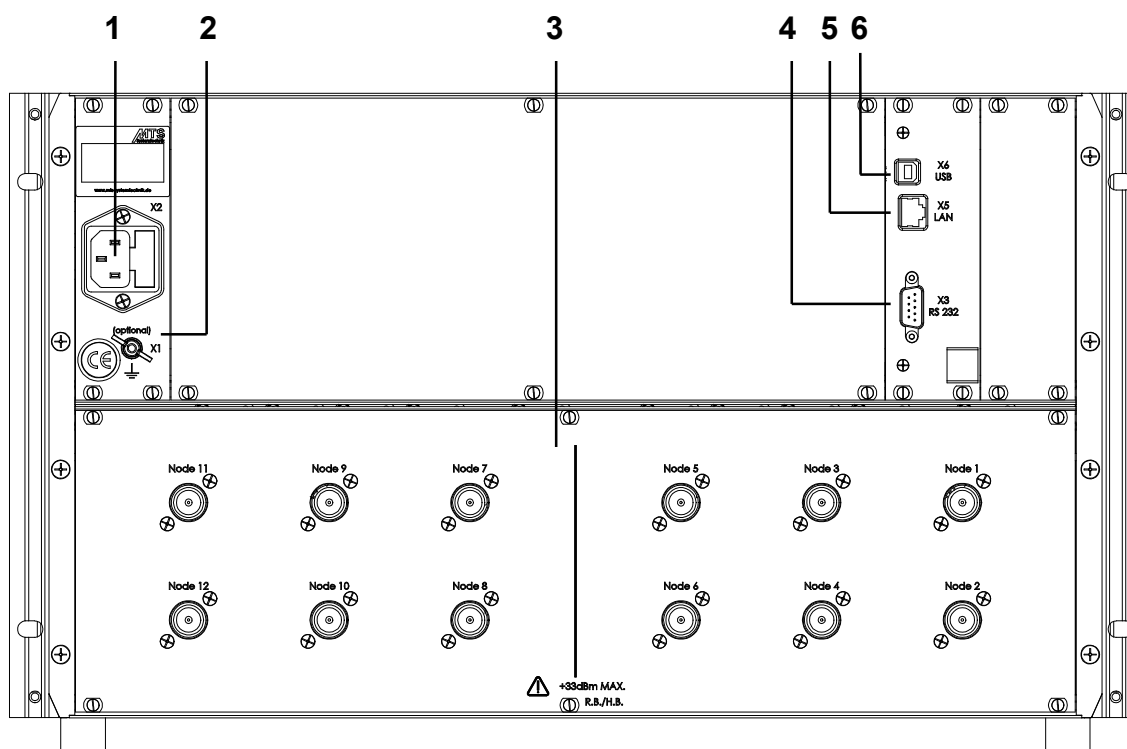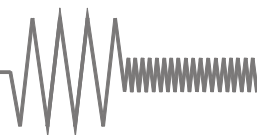Illustration 2: Rear view SCF-0600-6G

1.6 Starting up and operating / connections

Before using the unit following connections have to be done:

Ground-connection (optional use)

The unit has to be grounded expertly at the ground connector (look at illustration 2, position 2). A cable with a conductor cross-section of minimum 1.5 mm² has to be used. Alternatively a correct ground connection by connector X2 is allowed.

Power supply

The power supply voltage range of the unit is 100 V - 240 V at 50 Hz / 60 Hz at connector X2 (look at illustration 2, position 1).

RF-connections

Cables and RF-connectors N-male with an impedance of 50 Ω are required. Cables can be connected without RF-power during the operation.

Interface connection

In order to operate the device by remote control, a data cable has to be connected.

Attention: Before connecting the data cable, the device has to be shut off at power switch S1.

Check all connections for correct hook up,
before turning the power on.
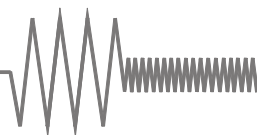
1.7 Starting up and operating / turning off and turning on

You can do a reset of the unit by switching off the power switch S1 at the front panel. After waiting at least 30 seconds and turning on the unit it will boot again and then it will work normally.

The control card detects voltage errors of the power supplies. While the error is present it is not possible to save any adjustment. At disappearing of a voltage error, the error message changes into a voltage warning. Saving of adjustments is now enabled again. Dependent on the power consumption of the components possibly a voltage error is shown at shutdown.

On starting the unit or returning of power (if the power switch is on) all variable attenuators will switch to 95 dB.

Attention: Before starting make sure the unit is standing safely or is build-in safely.

The operating temperature of the unit has to be between 0 °C and +50 °C.
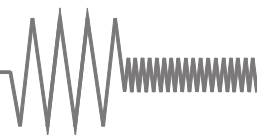
2 CONTROLLING OF THE UNIT

After switching power on, the seven-segment displays can be checked optically and then they show the values of the attenuators. Now it is possible to control the unit by the UP/DOWN-keys, the RS-232-interface, the LAN-interface or the USB-interface.

2.1 Updating the unit

The unit consists of a module for updating the firmware. Updating the firmware is exclusively allowed under guidance of MTS Systemtechnik GmbH.

2.2 Operating modes

2.2.1 Showing modes for IP-address or baud rate

The unit shows the IP-address for 5 seconds when the most left UP/DOWN-keys are pressed at the same time for 1 second. The shown address was read at the last booting of the unit. If the LAN-module has not offered the address 12x '-' is shown. After this 5 seconds the unit changes to normal working mode without changing LOCAL or REMOTE.

The unit shows the current baud rate for 5 seconds when the UP/DOWN-keys at second position from left are pressed at the same time for 1 second.
After this 5 seconds the unit changes to normal working mode without changing LOCAL or REMOTE.

2.2.2 Changing LOCAL to REMOTE

The unit starts at LOCAL mode. It changes into REMOTE mode automatically when receiving the first REMOTE set command. All REMOTE-interfaces have equal rights. Its commands are executed in the same order as received.

During the both modes the seven-segment displays are updated continuously and show the set values of the attenuators.
The "DOT" at the displays shine during the REMOTE mode.

The change from REMOTE to LOCAL occurs automatically by touching one of the UP/DOWN-keys for the attenuation.
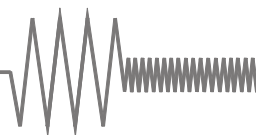
2.3 Power level indication for 700 MHz – 6000 MHz

The RF input power levels for Node 1 – Node 12 at the backplane
are measured by detectors.

The measured levels are shown at LEDs at the frontpanel above the symbols for the attenuators.

Not used connectors of the Node inputs and Node outputs have to be terminated by 50 Ω.

Levels and indication

for   700 MHz - 3000 MHz:

x <= -45 dBm		±5 dBm	LED is not illuminated
-45 dBm < x		±5 dBm	LED is illuminated green
	x <= + 10 dBm	-10 / +0 dBm	LED is illuminated green
	+ 10 dBm < x	-10 / +0 dBm	LED is illuminated red

for 3000 MHz - 5500 MHz:

x <= -45 dBm		±5 dBm	LED is not illuminated
-45 dBm < x		±5 dBm	LED is illuminated green
	x <= + 10 dBm	±5 dBm	LED is illuminated green
	+ 10 dBm < x	±5 dBm	LED is illuminated red

for 5500 MHz - 6000 MHz:

x <= -45 dBm		-5 / +10 dBm	LED is not illuminated
-45 dBm < x		-5 / +10 dBm	LED is illuminated green
	x <= + 10 dBm	-5 / +15 dBm	LED is illuminated green
	+ 10 dBm < x	-5 / +15 dBm	LED is illuminated red

Attention: If the LED of a path is illuminated red, it is necessary to assure that the input power of this path is lower than +33 dBm resp. will not exceed this level.
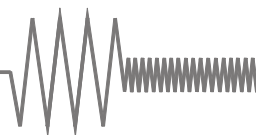
2.4   Manual operation

The manual operation is realized by the UP/DOWN-keys.
The functions of the keys are described at the following.

The current states of all semiconductor attenuators
are shown on the seven-segment displays.

The seven-segment displays and the UP/DOWN-keys are
assigned to Node outputs at the front panel, e. g. display1 (on the left hand-side)
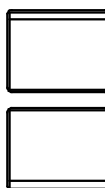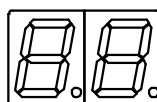to Node 1.

Illustration 3: Seven-segment displays of SCF-0600-6G

The following functions are carried out by the UP/DOWN-keys:

The key at the top increases attenuation in 1 dB steps.
The key at the under part reduces attenuation in 1 dB steps.

The attenuators are assigned to Node outputs at the front panel,
e. g. attenuator 3 to Node 3 or two outputs are coupled by 3 dB to the front panel
e.g. attenuator 1 and 2 to Node 1/2 like noticed.

If any key is pushed and hold, the speed to increase or to reduce the value will rise.

The keys are assigned to related attenuators.

Attention: If the LED of a path is illuminated red, it is necessary to assure that the
input power of this path is lower than +33 dBm resp. will not exceed this
level.

Refer to chapter 2.2.1 for special showing mode additionally.
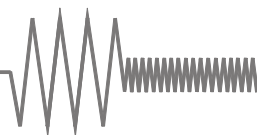
2.5 The RS-232-interface

The integrated RS-232-interface is laid out as a 9-pole SUB-D plug. The pins are connected according to RS-232-standard.

A zero modem cable (RX/TX crossed) is required for the connection. The recommended length of the interface cable is 15 m max..

2.6 Interface protocol RS-232

The transmission of data is carried out in ASCII format.

Start command: STX = 0x02$_H$ (written as \02 or [0x02] usually)
(Alternatively z in ASCII format can be used, answers from the unit in respect use z for STX and Z for ETX.)
End command: ETX = 0x03$_H$ (written as \03 or [0x03] usually)
(Alternatively Z in ASCII format can be used.)

Following parameters of the RS-232-interface are fix and can not be changed:

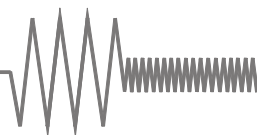8 Databits
1 Startbit
1 Stopbit
No parity
No handshake

2.7 Configuration of the RS-232-interface

The user can select between three baud rates. Basic setting is 115200 baud.

The baud rate can be set by remote control. At this case the unit changes into remote mode.

Receive string: "ST-BA*y*"

y is the switched baud rate (9600, 57600 or 115200 in ASCII format).

2.8   The Ethernet-interface

The LAN-interface is laid out as 8-pole RJ45-female-plug.

2.9   Interface protocol Ethernet

The transmission of data is carried out in ASCII format.

Start command: STX = 0x02ₕ (written as \02 or [0x02] usually)
   (Alternatively z in ASCII format can be used, answers
   from the unit in respect use z for STX and Z for ETX.)
End command: ETX = 0x03ₕ (written as \03 or [0x03] usually)
   (Alternatively Z in ASCII format can be used.)

The Ethernet-interface is internally connected by RS-232. Following internal parameters are fix and can not be changed:

   115200 Baud
   8 Databits
   1 Startbit
   1 Stopbit
   No parity
   No handshake

2.10 Configuration of the Ethernet-interface

Interface set-up (IP-address, port) can be done by using a webbrowser (e. g. internet explorer) via putting in the IP-address.

Basic setting is TCP-protocol, IP-address "192.168.83.50" and port 4001.

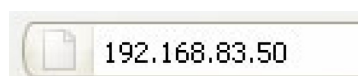Illustration 4: Insertion of IP-address at browser-window

Attention: The areas of the IP-address must not begin with leading zeros (wrong: 192.168.083.050, right: 192.168.83.50)!

If you can not find your IP-address anymore, look at chapter 2.2.1. or use the DeviceInstaller from Lantronix and search it (search button). By opening the folders the current IP-address will be shown (self-explanatory).

Calling the IP-address through a browser:

After calling the IP-address you can acknowledge the keyword-window without any entries (OK). The configuration window opens automatically as follows.

Illustration 5: Keyword-window of the LAN-module

Adjusting the IP-address through a browser:

You can adjust the IP-address in the following window. Alternatively, you can select "Obtain IP address automatically" to work with DHCP-mode.
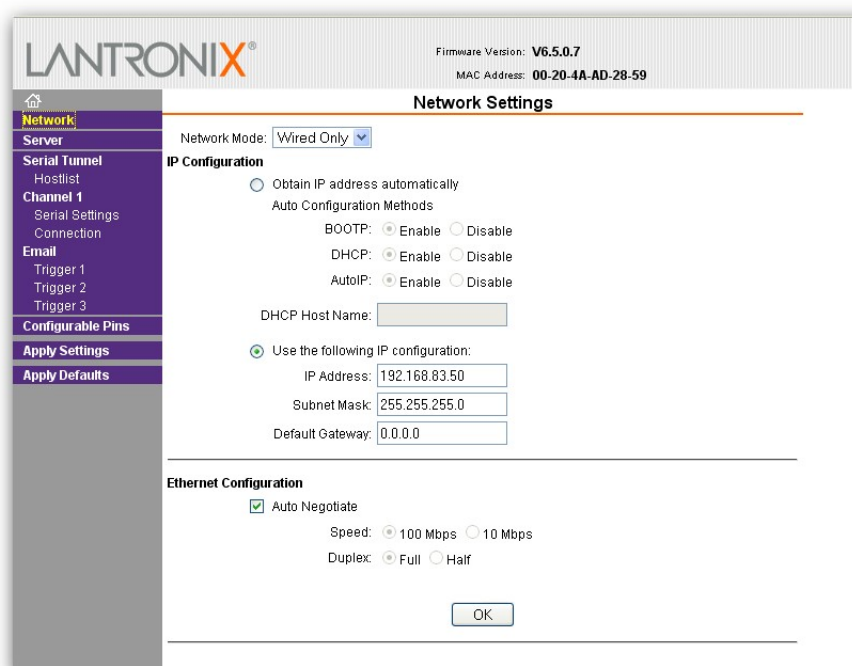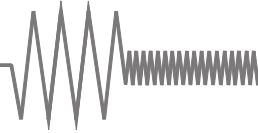

Illustration 6: Adjustment of IP-address of the LAN-module

Attention: After changes you have to press OK
and then you have to execute Apply Settings!

Executing further operations:

To do extended operations use the document Extended_Configuration_XPORT_Module on the CD of the unit.

2.11 The USB-interface

The USB-interface is laid out as a 4-pole USB-female-plug, type B (square).

The recommended length of the interface cable is 5 m max..

2.12 Interface protocol USB

The transmission of data is carried out in ASCII format.

Start command: STX = $0x02_H$ (written as \02 or [0x02] usually)
(Alternatively z in ASCII format can be used, answers from the unit in respect use z for STX and Z for ETX.)
End command: ETX = $0x03_H$ (written as \03 or [0x03] usually)
(Alternatively Z in ASCII format can be used.)

The USB-interface is internally connected via RS-232. Following internal parameters are fix and can not be changed:

    115200 Baud
    8 Databits
    1 Startbit
    1 Stopbit
    No parity
    No handshake

### 2.13 Configuration of the USB-interface

To use the USB-interface it is necessary to install the CDM-driver from the CD. This driver installs a virtual COM-port at your computer. With this COM-port you can control the unit. You can find an installation manual on the CD of the unit, too.

Alternatively, you can download new drivers for the interface FT232L from the internet on www.ftdichip.com.
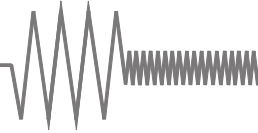
2.14 Control commands of the unit

All REMOTE-interfaces have equal rights. Its commands are executed in the same order as received.

2.14.1 Set command

Receive string: "RxPy"   or   "AxPy"

e. g. receive string: "R1P1R2P1"   or   "A1P1A2P1"

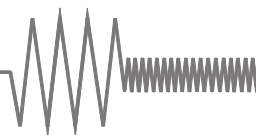"RxPy" or "AxPy": x is the attenuator number
            (1 – number of attenuators in ASCII format).
            y is the switched position of the attenuator
            (0 – 95 in ASCII format).

It is possible to control several attenuators with one receive string.

2.14.2 Clear command

Receive string: "C"

With the clear command all variable attenuators are set to 95 dB.

2.14.3 Status check

After one of the following commands was received, the unit sends a string with the state of its components.

Receive string: "ST", "ST1" or "ST2"

Send string: "R1Py_1R2Py_2 … R12Py_{12}ERRv*MOD*" (ERRv only at "ST1" or "ST2")

> *y* is the switched position of the variable attenuator
> (0 – 95 in ASCII format).

> *v* is the error state of the unit, which is just displayed at receive string "ST1" or "ST2" (value is 0 – 3 in ASCII format, 0 means no error has occurred, 1 means voltage error is active (1 possibly occurs at shutdown of the unit but not assured), 2 means voltage warning after voltage error has disappeared, 2 can not be displayed at "ST2" because it is reset by "ST2" before answering, resetting 2 by "ST2" sets the unit to remote mode, 2 is reset by resetting the unit, 3 means internal control error, contact the manufacturer.

> *MOD* is the working mode of the unit (LOC means LOCAL, REM means REMOTE).

This string begins with the start command and ends with the end command.

Receive string: "STV"

Send string: " V1Py_1V2Py_2 … V12Py_{12}

> *y* is the decimal value of the input level in Volt at the Node 1 – 12 (0.000 – 5.000 in ASCII format, 5.000 means reading error).

This function is meant for getting defined levels at defined frequencies by the user.

This string begins with the start command and ends with the end command.

Receive string: "STR"

Send string: " L1Py_1L2Py_2 … L12Py_{12}

> *y* is the state of the level indicators
> (0 – 2 in ASCII format, 0 means the red led is illuminated, 1 means the green led is illuminated and 2 means no led is illuminated)

This string begins with the start command and ends with the end command.
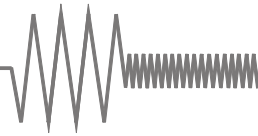
After one of the following commands was received, the unit sends the corresponding string with the state of the according interface.

Receive string: "ST-BA"

Send string: "ST-BA*y*"

> *y* is the baud rate in ASCII format (9600, 57600, 115200).
>
> This string begins with the start command and ends with the end command.

Receive string: "ST-IP"

Send string: "ST-IP*y*"

> *y* is the IP-address in ASCII format (e. g. 192.168.83.50), which was read at the last booting of the unit. If the LAN-module has not offered the address the unit answers "ST-IP Reading Error" at this request.
>
> This string begins with the start command and ends with the end command.

2.14.4 Ident command

Receive string: "*IDN?"

After sending the ident command the device answers with the device-identifier. The device-identifier begins with the start command and ends with the end command.
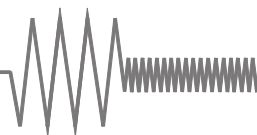
2.15 Characteristics of the remote controlling at occurring errors of commands

Attention: It is absolutely recommended to set not more than eight components by one command (without STX and ETX between the Strings). The whole string has to be defined by STX at the start and ETX at the end.

One command is executed when the end command is received correctly.

Once the unit detects a wrong syntax of a command while executing, it breaks interpreting commands and starts again at the next detected start command.

At set commands beside the syntax, the numbering is checked, too. If components are set, which do not exist, the unit breaks the command and starts the analysis again at a detected start command. If not existing positions of the selected component are set, the unit breaks the command and starts the analysis again at a detected start command.

In the following examples is the set command letter "R" specified. The same applies for the set command letter "A".

STX and ETX are shown in following cases, too:

STX is written as \02 or [0x02] usually
(Alternatively z in ASCII format can be used.),
ETX is written as \03 or [0x03] usually
(Alternatively Z in ASCII format can be used.).

Correct string: "[02$_H$]R1P2R2P1R3P0[03$_H$]"
Reaction: Three attenuators are set.

Incorrect string: "[02$_H$]R1P2R2P***100***R3P0[03$_H$]" "[02$_H$]R4P1[03$_H$]"
Reaction: Attenuator 1 is set, Attenuator 2 and 3 are not set,
because position 100 does not exist.
Attenuator 4 is set, because a new command has been started.

Incorrect string: "[02$_H$]R1P2R***40***P1R3P0[03$_H$]" "[02$_H$]R4P1[03$_H$]"
Reaction: Attenuator 1 is set, attenuator 40 and 3 are not set,
because attenuator 40 does not exist.
Attenuator 4 is set, because a new command has been started.

Incorrect string: "[02$_H$]R1P2***X***1P1R3P0[03$_H$]" "[02$_H$]R4P1[03$_H$]"
Reaction: Attenuator 1 is not set, because *X*1P1 is an unknown component.
Attenuator 3 is not set, because command was broken before.
Attenuator 4 is set, because a new command has been started.
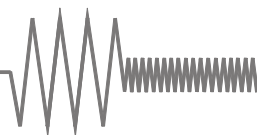
3 SERVICE

3.1 Changing fuse of 230 V AC supply

Inside of the appliance plug there are the fuses F1 and F2. Defective fuses have to be changed by fuses of the same type. Pull out the fuse holder at zero-current-unit (power cable removed) to get access to the fuses.

Attention: To change fuses, first switch off power at power switch S1 **a n d** remove the power cable!

Defective fuses have to be replaced by new fuses of the following type!
F1, F2 = T3.15/250 (3.15 A, 250 V AC, slow blow)

3.2 Cleaning

Maintenance work essentially only includes the cleaning of the unit.
Inform competent authorized personnel if damages are determined.

Attention: To clean the unit, first switch off power at power switch S1
a n d remove the power cable!
Depending on the degree of contamination, the unit has to be cleaned with a lint-free, soft and dry cloth or brush. Do not use cleaning liquids except for mild detergents (moisten cloth) for cleaning!

3.3 Maintenance and repair

No regular maintenance check for the unit is required.
Checking the unit is done by calibration.

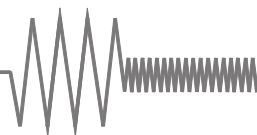During the warranty period only the manufacturer is authorized to repair the unit.
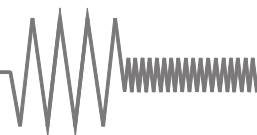
4   TECHNICAL DATA

Technical data are shown on the specification sheet in the appendix.
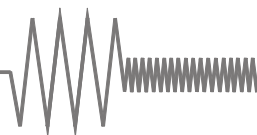
5   WARRANTY

The "General Terms and Conditions for Delivery and Payment of MTS Systemtechnik GmbH" or agreed warranty terms are applicable.

There will be no warranty for damages caused by improper handling, improper operation, technical changes, maintenance or physical damages, if these damages were not caused by MTS Systemtechnik GmbH.

6 APPENDIX

Is the manual delivered as CD, you can find the separate files of appendix as pdf on the CD.

Annex 1   Specification for the Coupling Unit SCF-0600-6G

Annex 2   Block diagram for the Coupling Unit SCF-0600-6G

Annex 3   Test certificate for the Coupling Unit SCF-0600-6G

Annex 4   EC-Declaration of conformity for the Coupling Unit
SCF-0600-6G

Annex 5   Extended_Configuration_XPORT_Modul

Annex 6   Driver and installation manual of the USB-interface