INSTALLATION MANUAL MCTS

CONTENTS

1. INTRODUCTION

The MCTS is a multi channel high precision current transducer system with transducer heads from 60 A_{rms} up to 1000 A_{rms} sinusoidal current (85 A_{pk} to 1414 A_{pk}).

1.1 MAXIMUM RANGES

Transducer	rms[1] (100%)	pk[2] (100%)	DC[3] (100%)	Overload rms[4]
IT 60-S	60 A	85 A	60 A	300 A
IT 200-S	200 A	283 A	200 A	1000 A
IT 400-S	400 A	566 A	400 A	2000 A
IT 600-S	600 A	660 A	600 A	3000 A
IT 700-S	700 A	848 A	700 A	3500 A
IT 1000-S/SP1	1000 A	1414 A	1000 A	4000 A

1) Valid for sinusoidal current waveform
2) Maximum peak current range
3) Maximum DC current range
4) Short time overload range (DC/peak current range for 100 ms)

1.2 MINIMUM RANGES

Linearity and offset error of the transducers are just a few ppm of the maximum current range. 1 ppm is equal to 0.0001%. The lowest possible current to measure mainly depends on the input range of the associated instrument. Normally the MCTS current output is connected directly to an instrument current input. This is in fact the most precise and least noise sensitive solution. At instruments which are equipped with high current input terminals the MCTS current output signal needs to be connected to the current sensor input of the instrument via a burden resistor.

2. RECEIVING OF GOODS

The standard MCTS is delivered as a three channel system. It can be equipped up to a six channel system by the installation of additional current modules CM.

2.2 MCTS STANDARD DELIVERY

- 19 inch rack with three internal power supplies
- Three current transducers IT 60-S … IT 1000-S/SP1
- Three transducer connection cables of 10 meters
- Power cord
- Installation manual

2.3 CM STANDARD DELIVERY (already installed when ordered with MCTS)

- One internal power supply with connection cable and mounting brackets
- One current transducer IT 60-S … IT 1000-S/SP1
- One transducer connection cable of 10 meters

For the connection of the MCTS to power analyzer current sensor input terminals, plug-on burden resistors MCTS/BR are available. These burden resistors need to be ordered separately (see data sheet).

3. HARDWARE INSTALLATION

Before switching on the primary current trough the transducer it has to be certain that the MCTS is connected to the grid and switched on. In addition the current output of the MCTS must be connected to a power meter, a burden resistor or any other instrument which ensures a current loop trough the transducer. If there is no instrument available the MCTS current output terminals can be shorted.

CAUTION !

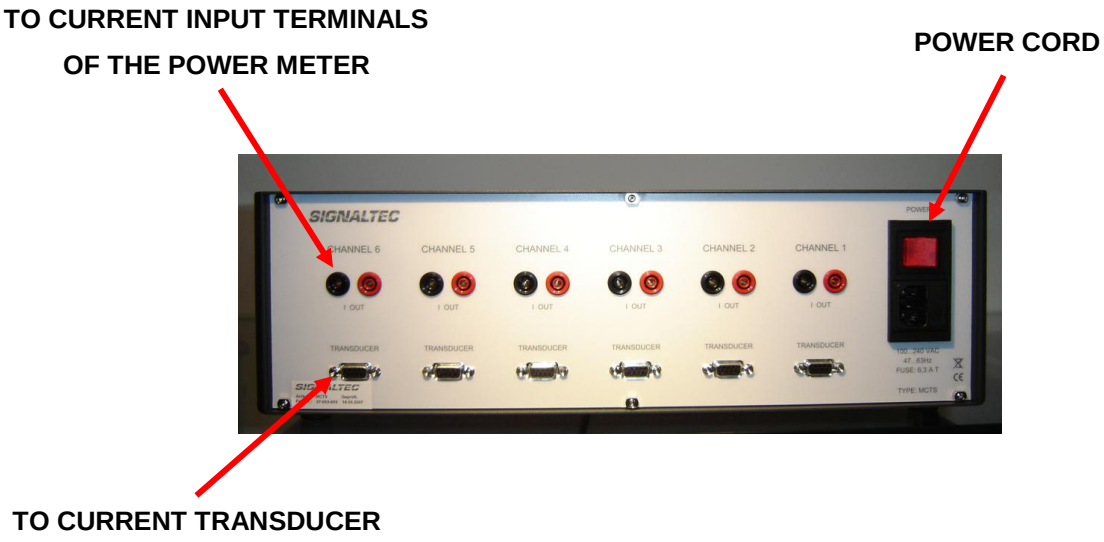
Before you apply a primary current all transducers must be connected to the MCTS rack and the system must be powered.

A high current trough a non-powered transducer can result in some 10 ppm offset.

A disconnection of the transducer connection cable or an interrupt in the current output loop under load can destroy the transducer electronics.

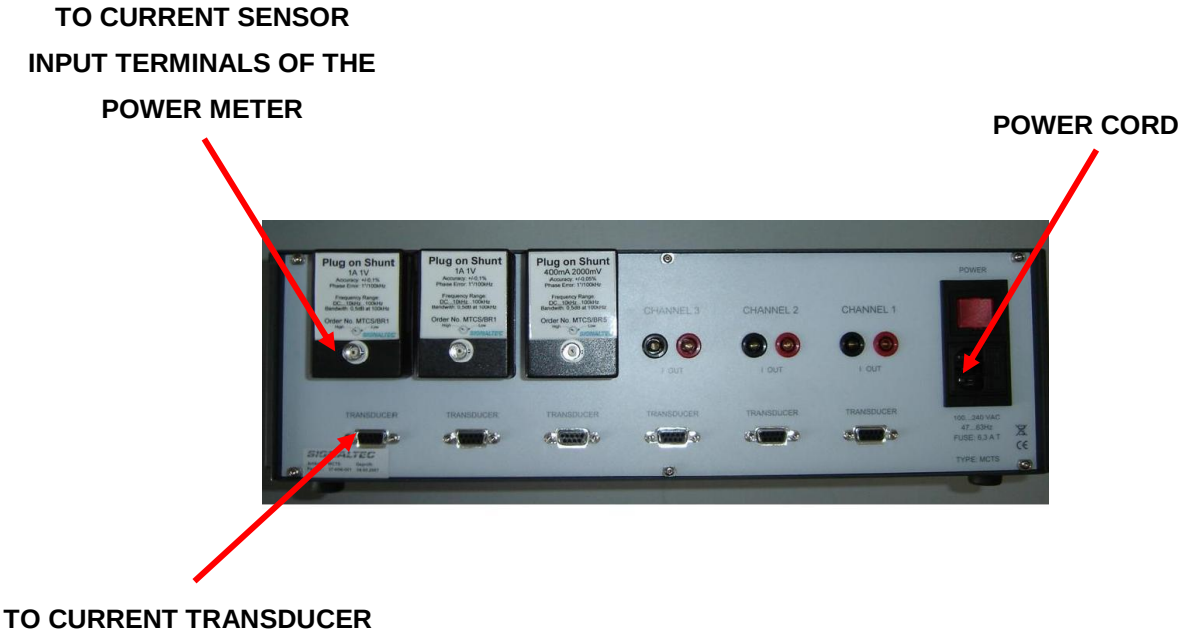
3.1 CONNECTION OF MCTS CURRENT OUTPUT TO POWER ANALYSER CURRENT INPUT

The transducers will be connected to the MCTS back panel by means of the grey D-sub connection cables. The current output terminal for each channel is placed above the transducer connection input terminal. The output current will be connected to the current input terminals of the power meter via normal 4 mm safety leads. The direction of current and power is defined by the arrow on the transducer and the color of the current output terminals (red = high, black = low).

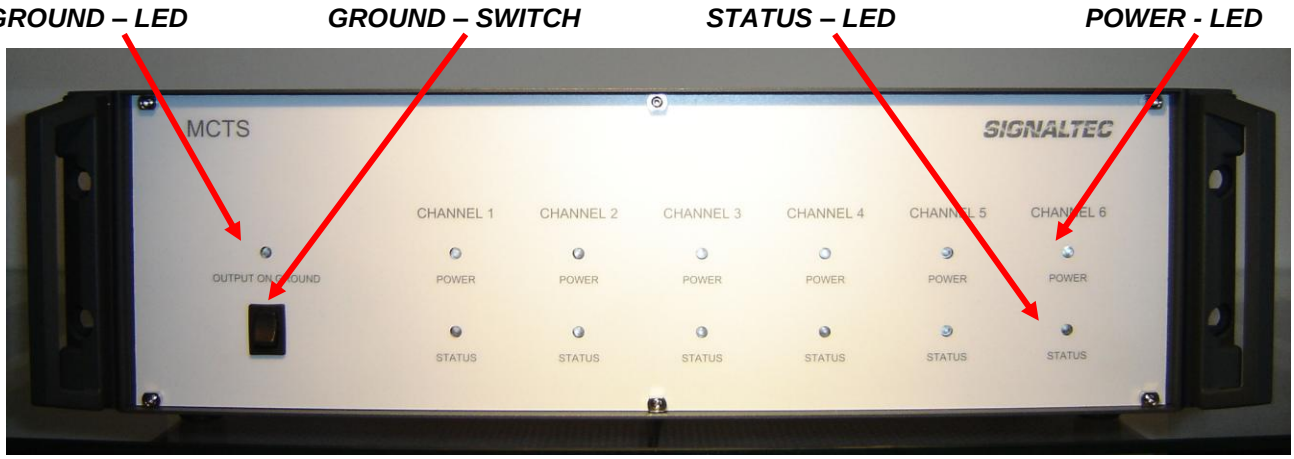


3.2 CONNECTION OF MCTS CURRENT OUTPUT TO POWER ANALYSER CURRENT SENSOR INPUT VIA MCTS-BR BURDEN RESISTORS

The transducers will be connected to the MCTS back panel by means of the grey D-sub connection cables. The current output terminal for each channel is placed above the transducer connection input terminal. The MCTS/BR burden resistors can be plugged in the current output terminals. Via a BNC connection cable the output voltage will be connected to the current sensor input of the power meter. The direction of current and power is defined by the arrow on the transducer, the color of the current output terminals (red = high, black = low) and the BNC connector (inner terminal = high, outer terminal = low).



4. OPERATION INSTRUCTIONS



When all transducers are connected to the MCTS rack and each current output terminal is connected to a power meter or burden resistor, the system can be switched on. The operation status of the MCTS is visualized by means of two LED's ***POWER*** and ***STATUS*** at the front panel.

POWER-LED off: System not powered or channel not installed
POWER-LED green: Channel powered
STATUS-LED off: System not powered or channel not installed
STATUS-LED green: Transducer connected, normal operation
STATUS-LED red: Transducer overloaded or interruption in circuit, switch primary current off!

In standard mode all MCTS channels are galvanic separated. With the ***GROUND***-switch all output low terminals can be connected to ground via a PTC resistor. The transducers are galvanic separated from the measurement circuit and therefore common mode or EMC problems are not probable. In case of a high frequent capacitive common mode current to the housing of the rack or the power meter a connection to the ground might be an improvement.

CAUTION !

It has to be avoided to connect the grounded MCTS output terminal via a burden resistor to the sensor input terminal of the power meter when the internal shunt of the power meter is directly connected to high potential. Normally, the internal shunt and the sensor input of a power meter are connected internally. If the internal shunt is on high potential and the sensor input is connected to ground via the MCTS, both transducer system and power meter can be destroyed. The internal PTC resistor will limit this risk to a great extent up to a voltage level of a few 100 Volts.

5. SCALING OF POWER ANALYSER INPUT RANGES

5.1 SCALING OF ANALYSER DIRECT CURRENT INPUT RANGES

In this case the current transducer ratio needs to be programmed in the power meter menu for the direct current input terminal.

System	Maximum Primary Current	Maximum Output Current	Current Transducer Ratio	Scaling Factor
MCTS 60	60 A_{rms}	100 mA_{rms}	60A/100mA	600 : 1
MCTS 200	200 A_{rms}	200 mA_{rms}	200A/200mA	1000 : 1
MCTS 400	400 A_{rms}	200 mA_{rms}	400A/200mA	2000 : 1
MCTS 700	700 A_{rms}	400 mA_{rms}	700A/400mA	1750 : 1
MCTS 1000	1000 A_{rms}	1000 mA_{rms}	1000A/1000mA	1000 : 1

5.2. SCALING OF ANALYSER CURRENT SENSOR RANGES FOR MCTS/BR BURDEN RESISTORS

For the connection of the MCTS to a current sensor input terminal of a power meter plug-on burden resistors MCTS/BR10 (10 Ω for MCTS 60), MCTS/BR5 (5 Ω for MCTS 200 and 400), MCTS/BR2.5 (2.5 Ω for MCTS 700) and MCTS/BR1 (1 Ω for MCTS 1000) can be ordered.

System	Current Transducer Ratio	Burden Resistor	Scaling Factor
MCTS 60	600 : 1	MCTS/BR10	16.67 mV/A
MCTS 200	1000 : 1	MCTS/BR5	5.000 mV/A
MCTS 400	2000 : 1	MCTS/BR5	2.500 mV/A
MCTS 700	1750 : 1	MCTS/BR2.5	1.429 mV/A
MCTS 1000	1000 : 1	MCTS/BR1	1.000 mV/A

5.3. SCALING OF ANALYSER CURRENT SENSOR RANGES FOR ANY BURDEN RESISTORS

Other burden resistors should meet the following requirements:

- The power losses must be high enough
- The amplitude accuracy must be high enough (low T_c)
- The angle error must be low enough
- The resistance value should not be too high (see transducer data sheet)

Calculation example for MCTS 700 and burden resistor 2.34 Ω

Current transducer ratio MCTS 700:	1750 : 1
Resistance value:	2.34 Ω
Maximum power losses ($I^2 \cdot R$):	$(0.4\ A)^2 \cdot 2.34\ \Omega = 0.37\ W$
Resulting scaling factor:	2.34 V/A divided by 1750 A/A results in 1.337 mV/A

6. SWITCHING OFF AND DEINSTALLATION

Before the MCTS system can be switched off and transducer connection cables or current output connections can be interrupted the primary current circuit needs to be switched off.