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# 1 General Information

## 1.1 ⚠ Safety Instructions

☞ **Note** **Wherever you see this sign ⚠ you will find information on potential hazards. Please read these sections with particular care!**

⚠ **Warning!** Before opening the SC 600 disconnect the mains plug!

⚠ **Attention!** Our instrument fuses are dimensioned in such a way that optimum protection is guaranteed for the SC 600 and the user.
If the fuse has to be changed, use only G fuse-link 5 × 20 according to IEC 127 (see 4.1)!

⚠ **Attention!** The T160 replacement fuses contained in the accessories are intended for a mains voltage of 115 V and must not be used at a mains voltage of 230 V!

## 1.2 Switching the Operating Voltage 230 V~/115 V~

⚠ **Attention!** Your SC 600 left the factory set to 230 V. Switching to 115 V requires the SC 600 to be opened, which should only be done by trained personnel.

Setting the operating voltage 115 V~

1. Disconnect the SC 600 from the mains.
2. Remove upper caps and loosen the screws below.
3. Identify the mains voltage switch by means of the following illustration.
4. Switch the mains voltage switch (slide switch) located under the power switch to the indication “115”.
5. Remove safety cover at the mains plug and replace the fuse with the fuse for 115 V supplied with the instrument.
6. Fasten upper caps and put the sticker supplied with the instrument for marking the switch-over to 115 V on to the type label.

Mains voltage switch


115 V position


230 V position

## 1.3 Mains Connection

⚠ **Attention!**

The design of the unit meets the requirements of safety class I according to EN 61010-1, i. e. all metal parts accessible from outside and exposed to contact are connected with the protective conductor of the supply network.
Power is supplied via a mains cable with earthing contact.

## 1.4 Installing the SC 600

⚠ **Attention!**

The SC 600 should not be operated close to equipment that develops heat.
To protect the SC 600 from thermal overload the slots on the top side must not be covered.

## 1.5 Switching on

☞ **Note**

The SC 600 is switched on using the power switch at the front. The power switch separates the SC 600 completely from the primary side of the transformer.
The LED *I/O* serves as a status indicator.

## 1.6 Inspection and Maintenance

⚠ **Attention!**

If service is needed, due attention should be paid to the regulations according to VDE 0701. The SC 600 should only be repaired by trained personnel.

## 1.7 EMC

Radio interference suppression

The SC 600 is interference-free according to EN 50081 and EN 50082.

Prerequisite for EMC

In order to fulfil the limit values in line with present standards, it is absolutely essential that only cables which are in perfect condition be connected to the SC 600. The following information applies here:

- Metallic or metallized socket cases must be used for the serial interfaces RS-232C. The socket cases and the braided screen of the cables must be connected at the shortest distance possible. The signal earth must not be connected to the braided screen.
- After opening and closing the SC 600 check that all the fixing elements and contact springs are installed as before and that all the screws have been tightened.

## 1.8 Warranty

Conditions for warranty

DIGIMESS guarantees the perfect working order of the SC 600 for 12 months as from delivery.
There is no warranty for faults arising from improper operation or from changes made to the unit or from inappropriate application.

Returning the instrument

If a fault occurs please contact or send your SC 600 to:

The SC 600 should be returned in appropriate packing - if possible in the original packing. Please enclose a detailed fault report (functions working incorrectly, deviating specifications and so on) including unit type and serial number..

Identification

Kindly verify warranty cases by enclosing your delivery note. Any repairs carried out without reference to a valid warranty will initially be at the owner's expense.
Should the warranty have expired, we will, of course, be glad to repair your SC 600 as per our General Terms Of Assembly And Service.

## 1.9 Accessories Supplied

Contents

| | |
|---|---|
| 1 mains cable | 1XK64100 |
| 1 fine fuse | T80 L/250 V (230 V~) |
| 2 fine fuses | T160 L/250 V (115 V~) |
| 1 operating instructions | |
| 1 label for indicating the switch-over to 115 V | |

# 2 Application

**Performance features**

The System Controller SC 600, controlled by a microprocessor, is a compact interface controller. The SC 600 enables up to 6 instruments to be operated via the serial interface RS-232C (COM 1-6).

Different interface parameters can be set to match the unit to the respective instruments' interface:

- Baud rate
- Parity
- Communications protocol etc.

**Operation via PC**

The SC 600 does not have any operating elements (except the power switch). All functions and parameters are set with the help of a personal computer (PC) via the serial interface RS-232C (COM Ø).

Communication with the PC can be carried out with a baud rate of up to 38,400 Bd. The communications protocol is selectable.

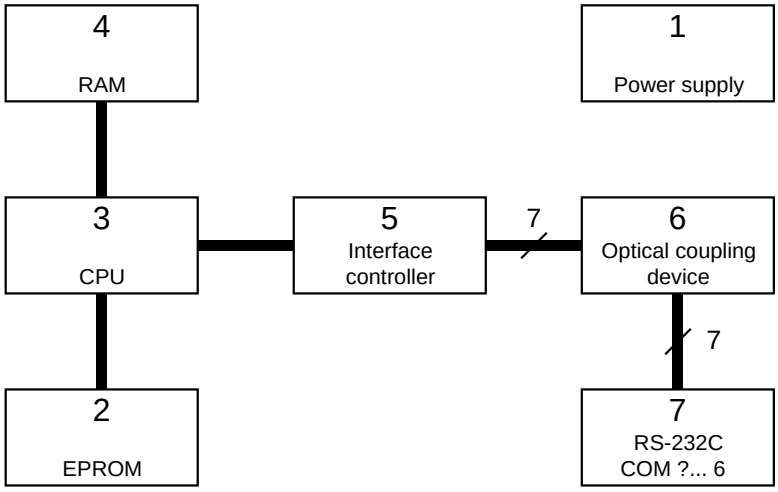
**Highlights**

All interfaces (COM Ø-6)

- have their own buffer for increasing the data flow
- have complete optical isolation.

# 3 Configuration and Functional Description

## 3.1 Block Diagram




**(1)** Power supply
**(2)** Program memory EPROM
**(3)** Microprocessor
**(4)** Data memory RAM
**(5)** Controller of the serial interfaces
**(6)** Optical coupling device
**(7)** RS-232C interface

## 3.2 Description

Internal control unit

The internal operational procedures are controlled by an one-chip microprocessor (3) with the help of additional circuits, e. g. program memory EPROM (2) and data memory RAM (4).

Data conversion

The control circuits of the serial interfaces [5] convert the parallel data of the microprocessor into serial data and vice versa. The serial data are led via the optocouplers [6] to the TTL/RS-232C converter [7] and then to the interface plugs. The serial data are led via the optocouplers [6] to the TTL/RS-232C converters [7] and then to the interface plugs.

Optical isolation

The level converters [7] are supplied by the optically isolated voltage sources of the power supply [1]. Together with the optocouplers [6], optical isolation of the serial interfaces is thus achieved.

Control of the SC 600

The SC 600 does not have any control elements (except the power switch). All functions and parameters are set via the serial interface RS-232C (COM Ø) with the help of a PC.

# 4 Technical Data

## 4.1 General Data

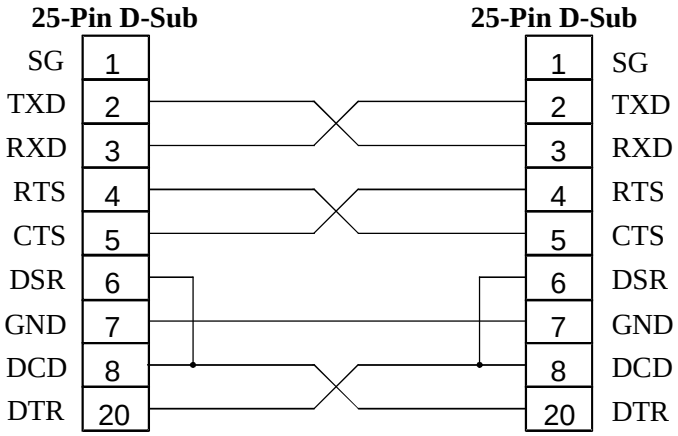
| | |
|---|---|
| Operating temperature: | + 5 ... + 40 °C |
| Nominal temperature: | + 23 °C ± 2 °C |
| Relative humidity: | 20 ... 80 % |
| Atmospheric pressure: | 70 ... 106 kPa |
| Operating position: | horizontal or inclined by ± 15 ° |
| Operating voltage: | sinusoidal alternating voltage<br>115/230 V (+ 10 %/– 15 %), internally switchable<br>50 ... 60 Hz (± 5 %)<br>Distortion factor less than 5 % |
| Power consumption: | max. 15 VA (max. 15 W) |
| Fuses: | T80 L/250 V (230 V~)<br>T160 L/250 V (115 V~)<br>Dimensions 5 × 20 mm, according to IEC 127 |
| Safety class: | I, according to EN 61010 Part 1 |
| Radio interference suppression: | EN 55011 Class B |
| Dimensions (L × H × D): | 225 mm × 85 mm × 200 mm |
| Dimensions of packing: | 315 mm × 115 mm × 270 mm |
| Weight of | |
| SC 600: | approx. 1.5 kg |
| incl. packing and accessories: | approx. 2.5 kg |

## 4.2 Specifications

### 4.2.1 Serial Interface COM Ø

| | |
|---|---|
| Interface plug: | 25-Pin D-Sub |
| Interface mode: | optically isolated |
| Baud rate in Bd: | 1,200, 2,400, 4,800, 9,600, 19,200, 28,800, 38,400 |
| Length of data word: | 8 Bit |
| Number of STOP bits: | 1 |
| Parity: | none |
| Communications protocol: | RTS/CTS or none (NONE) |
| Final character on receiving: | LF (10 dec.) |
| Final characters on transmission: | CR + LF (13 dec. + 10 dec.) |
| Length of input buffer: | 4 kB |
| Length of output buffer: | 4 kB |

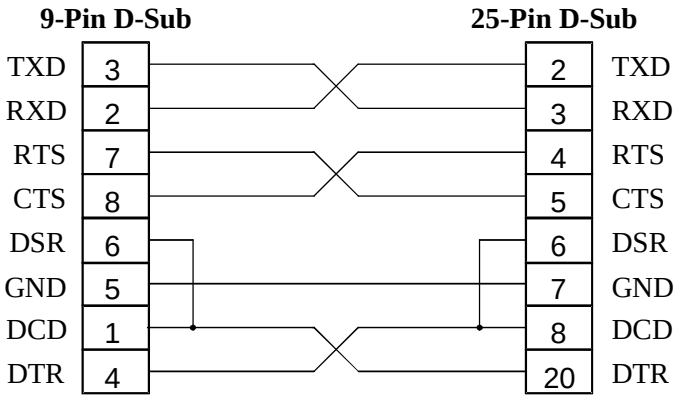
Plug connection of cable:




### 4.2.2 Serial Interfaces COM 1-6

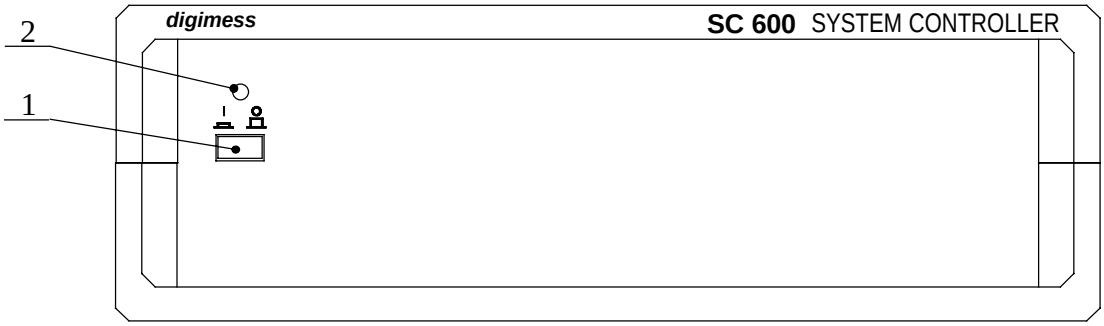
| | |
|---|---|
| Interfaces plug: | 9-Pin D-Sub |
| Interface mode: | optically isolated |
| Baud rate in Bd: | 110, 150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200 |
| Length of data word: | 5, 6, 7, 8 Bit |
| Number of STOP bits: | 1, 2 (1.5) |
| Parity: | none, unpaired, paired |
| Communications protocol: | RTS/CTS or none (NONE) |
| Length of input buffer: | 4 kB |
| Length of output buffer: | 4 kB |

Plug connection of cable:

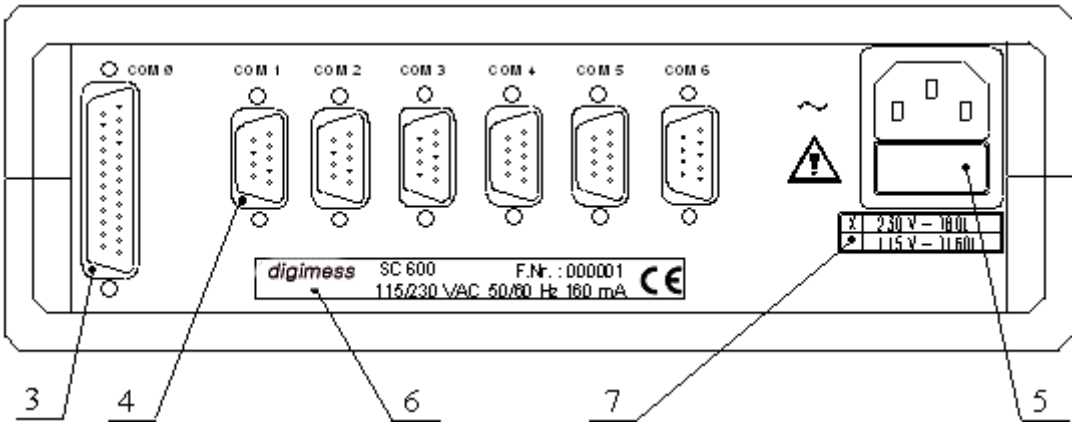


# 5 Control Elements

Front side of SC 600




Rear side of SC 600




**[1] Power switch**

**[2] LED I/O**

The LED indicates whether the SC 600 is ready for operation.

**[3] Plug of RS-232C interface COM Ø for connecting a PC**

**[4] Plug of RS-232C interfaces COM 1-6 for connecting the instruments**

**[5] Fused plug for non-heating appliances**

The SC 600 is protected by a T80 L/250 V fuse for 230 V~ or T160 L/250 V for 115 V~ net voltage respectively.

**[6] Type plate**

**[7] Operating voltage indication**

The operating voltage indication shows which operating voltage is to be used.

# 6 Operation by Program

## 6.1 Preparations of the SC 600

⚠ **Attention!** The connecting cables of the serial interfaces RS-232C (COM Ø-6) have to be connected before switching on the operating voltage.

Connecting the instruments

The SC 600 enables up to 6 instruments to be operated via the serial interface RS-232C (COM 1-6). The interfaces of the instruments must be configured as described in paragraph 4.2.2. The connecting cables must not be longer than 15 m.

Connecting the PC

Operation of the SC 600 with the help of a personal computer (PC) is possible via the serial interface RS-232C (COM Ø). The interface of the personal computer must be configured as described in paragraph 4.2.1. The connecting cable must not be longer than 15 m.

Switching on the SC 600

**1.** Connect the connecting cables between the SC 600 and the PC or instruments.

**2.** Screw the connections in tight.

**3.** Connect the SC 600 [5] to the mains with the mains cable.

**4.** Press the **power switch** [1].
- The LED *I/O* [2] lights up. After the initialization test the SC 600 can receive commands.

☞ **Note** Ensure that the SC 600, as well as the control PC and all instruments which are connected to the SC 600, are operated at the same phase of the mains voltage, that the earth loops have been and the ESD regulations are observed.

## 6.2 Communications Protocol between SC 600 and PC

Options

The SC 600 (COM Ø) can communicate with a PC **with** RTS/CTS protocol or **without** protocol.

### 6.2.1 Communication with RTS/CTS Protocol

Data received from PC

Signal **RTS=ON**
- SC 600 can receive data.

Signal **RTS=OFF**
- SC 600 cannot receive data.

Data transmitted to PC

Signal **CTS=ON**
- SC 600 transmitting data.

Signal **CTS=OFF**
- SC 600 not transmitting data.

### 6.2.2 Communication without RTS/CTS Protocol

Data received from PC

Signal **RTS=ON**

– SC 600 can always receive data, when the input buffer is overloaded the error 131 **INP.BUFFER FULL** is reported.

Data transmitted to PC

Signal **CTS=ON**

– SC 600 can always transmit data.

## 6.3 Messages of the SC 600

### 6.3.1 Description of the Instrument Status

Introduction

The current status of the operating conditions of the SC 600 can be interrogated at any time via the the following registers:

- ESR (Event Status Register)
- STB (Status Byte Register)
- RSR (Receive Status Register)
- TSR (Transmit Status Register)
- BOR (Buffer Overflow Event Register)

#### *6.3.1.1 ESR - EVENT STATUS REGISTER*

Meaning of the register

The current status of the SC 600 can be interrogated at any time via the ESR register.

Reading and deleting the register

The contents of the ESR register **<XXX>** within the range of **0** to **255** are saved in the output buffer (COM Ø) and deleted by transmitting the command **∗ESR?**.

The ESR register is set on **Ø** also after the following operations:

- Switching on the SC 600 (except bit 7)
- Transmitting the command ∗CLS
- Changing the interface parameters

Contents of the ESR register

**Bit 7:** (PON) Power On
Operating readiness and interface activities are displayed on **1**.

**Bit 6:** (URQ) User Request
Is not used, is always set on **Ø**.

**Bit 5:** (CME) Command Error
Is set on **1** at instruction errors.

**Bit 4:** (EXE) Execution Error
Is set on **1** at query errors and execution errors.

**Bit 3:** (DDE) Device Dependent Error
Device errors are displayed on **1**.

**Bit 2:** (QYE) Query Error
Is set on **1** at query errors.

**Bit 1:** (RQC) Request Control
Is not used, is always set on **Ø**.

**Bit 0:** (OPC) Operation Complete
Is set on **1** by transmitting the command **∗OPC**.

ESE - EVENT STATUS ENABLE REGISTER

Meaning of the register

Various statuses and settings of the SC 600 can be checked. For this the contents of the ESR register are called with the help of a mask. The single bits are compared and evaluated by the following logical equation:

- ESB = (ESR7 ∧ ESE7) ∨ (ESR6 ∧ ESE6) ∨ (ESR5 ∧ ESE5) ∨ (ESR4 ∧ ESE4) ∨ (ESR3 ∧ ESE3) ∨ (ESR2 ∧ ESE2) ∨ (ESR1 ∧ ESE1) ∨ (ESR0 ∧ ESE0)

The result ESB (Event Summary Bit) is entered in the STB register.

Describing the register

The command ***ESE <XXX>** offers the possibility of initializing the ESE register with any mask. The value **<XXX>** has to be within the range of **0** to **255**. Otherwise the error 134 **VAL. OUT OF RANGE** is reported.

Reading and deleting the register

The current contents **<XXX>** are saved in the output buffer (COM Ø) by transmitting the command ***ESE?**.

The ESE register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command *ESE 0
- Changing the interface parameters

### *6.3.1.2 STB - STATUS BYTE REGISTER*

Meaning of the register

The current status of the SC 600 can be interrogated at any time via the STB register.

Reading and deleting the register

The contents of the STB register **<XXX>** within the range of **0** to **255** are saved in the output buffer (COM Ø) by transmitting the command ***STB?**.

The STB register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command *CLS
- Changing the interface parameters (except bit 4 - MAV)

Contents of the STB register

**Bit 7:** Is not used, is always set on **Ø**.

**Bit 6:** (MSS) Master Summary Bit
Result during checkup of the STB register with a mask (SRE register, see below).

**Bit 5:** (ESB) Event Summary Bit
(Result during checkup of the ESR register with a mask (ESE register, see above).

**Bit 4:** (MAV) Message Available
Is set on **1** if a current message of the SC 600 is requested at the output buffer (COM Ø).

**Bit 3:** Is not used, is always set on **Ø**.

**Bit 2:** Is not used, is always set on **Ø**.

**Bit 1:** (TSB) Transmit Summary Bit
Result during checkup of the TSR register with a mask (TER register, see below).

Contents of the STB register

**Bit 0:** (RSB) Receive Summary Bit
Result during checkup of the RSR register with a mask (RER register, see below).

SRE - SERVICE REQUEST ENABLE REGISTER

Meaning of the register

Various statuses and settings of the SC 600 can be checked. For this the contents of the STB register are called with the help of a mask. The single bits (except SRE bit 6, always set on **Ø**) are compared and evaluated by the following logical equation:

- MSS = (STB7 ∧ SRE7) ∨ (STB5 ∧ SRE5) ∨ (STB4 ∧ SRE4) ∨ (STB3 ∧ SRE3) ∨ (STB2 ∧ SRE2) ∨ (STB1 ∧ SRE1) ∨ (STB0 ∧ SRE0)

The result MSS (Master Summary Status) is entered in the STB register.

Describing the register

The command ***SRE <XXX>** offers the possibility of initializing the SRE register with any mask. The value **<XXX>** has to be within the range of **0** to **255**. Otherwise the error 134 **VAL. OUT OF RANGE** is reported.

Reading and deleting the register

The current contents **<XXX>** within the range of **0** to **191** are saved in the output buffer (COM Ø) by transmitting the command ***SRE?**.
The SRE register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command ∗SRE 0
- Changing the interface parameters

### *6.3.1.3 RSR - RECEIVE STATUS REGISTER*

Meaning of the register

The current receive status of the serial interfaces COM 1-6 of the SC 600 can be interrogated at any time via the RSR register.

Reading the register

The contents of the RSR register **<XXX>** within the range of **0** to **126** are saved in the output buffer (COM Ø) by transmitting the command ***RSR?**.
The RSR register is set on **Ø** after the following operations:

- Switching on the SC 600
- Changing the interface parameters

Contents of the RSR register

**Bit 7:** Is not used, is always set on **Ø**.
**Bit 6:** **1** signals that the input buffer of the serial interface COM 6 is occupied.
**Bit 5:** **1** signals that the input buffer of the serial interface COM 5 is occupied.
**Bit 4:** **1** signals that the input buffer of the serial interface COM 4 is occupied.
**Bit 3:** **1** signals that the input buffer of the serial interface COM 3 is occupied.
**Bit 2:** **1** signals that the input buffer of the serial interface COM 2 is occupied.
**Bit 1:** **1** signals that the input buffer of the serial interface COM 1 is occupied.
**Bit 0:** Is not used, is always set on **Ø**.

RER - RECEIVE STATUS ENABLE REGISTER

Meaning of the register

The occupation of the input buffers of the serial interfaces COM 1-6 can be checked. For this the contents of the RSR register are called with the help of a mask. The single bits are compared and evaluated by the following logical equation:

- RSB = (RSR7 ∧ RER7) ∨ (RSR6 ∧ RER6) ∨ (RSR5 ∧ RER5) ∨ (RSR4 ∧ RER4) ∨ (RSR3 ∧ RER3) ∨ (RSR2 ∧ RER2) ∨ (RSR1 ∧ RER1) ∨ (RSR0 ∧ RER0)

The result RSB (Receive Summary Bit) is entered in the STB register.

Describing the register

The command ***RER <XXX>** offers the possibility of initializing the RER register with any mask. The value **<XXX>** has to be within the range of **0** to **255**. Otherwise the error 134 **VAL. OUT OF RANGE** is reported

Reading and deleting the register

The current contents **<XXX>** within the range of **0** to **255** are saved in the output buffer (COM Ø) by transmitting the command ***RER?**.
The RER register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command RER 0

### *6.3.1.4 TSR - TRANSMIT STATUS REGISTER*

Meaning of the register

The current transmit status of the serial interfaces COM 1-6 of the SC 600 can be interrogated at any time via the TSR register.

Reading the register

The contents of the TSR register **<XXX>** within the range of **0** to **126** are saved in the output buffer (COM Ø) by transmitting the command ***TSR?**.
The TSR register is set on **Ø** after the following operations:

- Switching on the SC 600
- Changing the interface parameters

Contents of the TSR register

**Bit 7:** Is not used, is always set on **Ø**.
**Bit 6:** **1** signals that the output buffer of the serial interface COM 6 is empty.
**Bit 5:** **1** signals that the output buffer of the serial interface COM 5 is empty.
**Bit 4:** **1** signals that the output buffer of the serial interface COM 4 is empty.
**Bit 3:** **1** signals that the output buffer of the serial interface COM 3 is empty.
**Bit 2:** **1** signals that the output buffer of the serial interface COM 2 is empty.
**Bit 1:** **1** signals that the output buffer of the serial interface COM 1 is empty.
**Bit 0:** Is not used, is always set on **Ø**.

TER - TRANSMIT STATUS ENABLE REGISTER

Meaning of the register

The occupation of the output buffers of the serial interfaces COM 1-6 can be checked. For this the contents of the TSR register are called with the help of a mask. The single bits are compared and evaluated by the following logical equation:

- TSB = (TSR7 ∧ TER7) ∨ (TSR6 ∧ TER6) ∨ (TSR5 ∧ TER5) ∨ (TSR4 ∧ TER4) ∨ (TSR3 ∧ TER3) ∨ (TSR2 ∧ TER2) ∨ (TSR1 ∧ TER1) ∨ (TSR0 ∧ TER0)

The result TSB (Transmit Summary Bit) is entered in the STB register.

Describing the register

The command ***TER <XXX>** offers the possibility of initializing the TER register with any mask. The value **<XXX>** has to be within the range of **0** to **255**. Otherwise the error 134 **VAL. OUT OF RANGE** is reported.

Reading and deleting the register

The current contents **<XXX>** within the range of **0** to **255** are saved in the output buffer (COM Ø) by transmitting the command ***TER?**.
The TER register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command TER 0

### *6.3.1.5 BOR - BUFFER OVERFLOW EVENT REGISTER*

Meaning of the register

The current status (overflow) of the serial interfaces COM Ø -6 (input buffer) of the SC 600 can be interrogated at any time via the BOR register.

Reading the register

The contents of the BOR register **<XXX>** within the range of **0** to **127** are saved in the output buffer (COM Ø) by transmitting the command ***BOR?**.
The BOR register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command BOR?
- Changing the interface parameters

Contents of the BOR register

**Bit 7:** Is not used, is always set on **Ø**.
**Bit 6:** The overflow of the input buffer of the serial interface COM 6 is displayed with **1**.
**Bit 5:** The overflow of the input buffer of the serial interface COM 5 is displayed with **1**.
**Bit 4:** The overflow of the input buffer of the serial interface COM 4 is displayed with **1**.
**Bit 3:** The overflow of the input buffer of the serial interface COM 3 is displayed with **1**.
**Bit 2:** The overflow of the input buffer of the serial interface COM 2 is displayed with **1**.
**Bit 1:** The overflow of the input buffer of the serial interface COM 1 is displayed with **1**.
**Bit 0:** The overflow of the input buffer of the serial interface COM Ø is displayed with **1**.

BOE - BUFFER OVERFLOW ENABLE REGISTER

Meaning of the register

The overflow of the input buffers of the serial interfaces COM 1-6 can be checked. For this the contents of the BOR register are called with the help of a mask. The single bits are compared and evaluated by the following logical equation:

- DDE = (BOR7 ∧ BOE7) ∨ (BOR6 ∧ BOE6) ∨ (BOR5 ∧ BOE5) ∨ (BOR4 ∧ BOE4) ∨ (BOR3 ∧ BOE3) ∨ (BOR2 ∧ BOE2) ∨ (BOR1 ∧ BOE1) ∨ (BOR0 ∧ BOE0)

The result DDE (Device Dependent Error) is entered in the STB register.

Describing the register

The command **∗BOE <XXX>** offers the possibility of initializing the BOE register with any mask. The value **<XXX>** has to be within the range of **0** to **255**. Otherwise the error 134 **VAL. OUT OF RANGE** is reported.

Reading and deleting the register

The current contents **<XXX>** within the range of **0** to **255** are saved in the output buffer (COM Ø) by transmitting the command **∗BOE?**.
The BOE register is set on **Ø** after the following operations:

- Switching on the SC 600
- Transmitting the command BOE 0

### 6.3.2 Description of Errors

Contents of the fault register

When errors occur in the settings and queries, they are saved with a code in the error register.

Reading and deleting the register

The contents of the error register (see 6.3.2.1) can be called at any time by transmitting the command **ERR?**.
If several errors arise only the error codes of the first and last error are saved. By repeatedly transmitting the command **ERR?** the contents of the error codes are filed in the output buffer (COM Ø).
The error register is set on **Ø** after the following operations:

- Repeated use of the command **ERR?** (according to the number of errors)
- Initialization of the status register with the command ***CLS** (see 6.4.3)

#### *6.3.2.1 Error Messages*

| **Error code** | **Error mode**<br>Text of messages | **Meaning of text** |
|---|---|---|
| 0 | - | Faultless operation |
| | **QUERY ERROR** | **Query error** |
| 120 | BAD USING QUERY | Used query is wrong |
| | **EXECUTION ERROR** | **Execution error** |
| 134 | VAL. OUT OF RANGE | Value is out of range |
| | **COMMAND ERROR** | **Command error** |
| 151 | ILLEGAL COMMAND | Unknown command |
| | **RS 232 ERROR** | **Error of the RS-232C interface** |
| 181 | INP. BUFFER FULL | Input buffer is full |

## 6.4 List of Commands

### 6.4.1 Initializing the Interface Unit COM Ø

***Break***

– Initializing the communications protocol of the interface COM Ø
– Initializing the interface circuit and deleting the buffer

☞ **Note**

The RS-232C signal *Break* does not affect the instrument functions. These should be initialised with the general command: ***RST**.

### 6.4.2 Initializing the Instrument Settings

***RST**
(Reset)

– Resetting the SC 600 in the initial status
– Deleting the input and output buffer of the serial interfaces COM 1-6
– Setting the serial interfaces COM 1-6:

| | |
|---|---|
| Baud rate: | 9,600 Bd |
| Length of data character: | 8 Bit |
| Number of STOP bits: | 1 |
| Parity: | none |
| Communications protocol: | none |

☞ **Note**

After switching on the SC 600 the commands ***RST** and ***CLS** are executed automatically and the contents of the ESE, SRE, REF and TER register are reset. Bit 7 (PON) of the ESR register is set on **1**.

### 6.4.3 Initializing the Status Structure

***CLS**
(Clear Status Byte)

– Resetting the ESR and STB register (except bit 4 - MAV)
ESE and SRE registers are not deleted..
– Initializing the error structure (see 6.3.2)

### 6.4.4 Self-Diagnosis of the SC 600

***TST?**
(Test)

– Starting the internal test and saving the result
where: **0** - test is successful
**1** - test is not successful

### 6.4.5 Identification of the SC 600

***IDN?**
(Identification)

– Identification ***digimess*,SC 600, <X...X>,<Y...Y>**
where: **<X...X>** - production number or 0
**<Y...Y>** - software version or 0

☞ **Note**

The query ***IDN?** should be written at the end of the command line because subsequent data can be lost before transmission. Otherwise the error120 **BAD USING QUERY** is reported.

### 6.4.6 Query of the Instrument Status

| | |
|---|---|
| **ERR?**<br>(Error) | – Reading and resetting of the error messages (see 6.3.2.1) |
| ***ESR?**<br>***ESE <XXX>**<br>***ESE?** | – Reading the ESR register (see 6.3.1.1) |
| ***STB?**<br>***SRE <XXX>**<br>***SRE?** | – Reading the STB register (see 6.3.1.2) |
| **RSR?**<br>**RER <XXX>**<br>**RER?** | – Reading the RSR register (see 6.3.1.3) |
| **TSR?**<br>**TER <XXX>**<br>**TER?** | – Reading the TSR register (see 6.3.1.4) |
| **BOR?**<br>**BOE <XXX>**<br>**BOE?** | – Reading the BOR register (see 6.3.1.5) |

### 6.4.7 Sync Commands

| | |
|---|---|
| ***WAI**<br>(Waiting) | – The following commands are executed only after completion of current operation. |
| ***OPC**<br>(Operation Complete) | – After completion of current operation bit 0 (OPC) in the ESR register is set on **1**. |
| ***OPC?** | – After completion of current operation the number 1 is saved in the output buffer (COM Ø). |

| | |
|---|---|
| ☞ **Note** | In the SC 600 all commands are executed sequentially. The execution of the next command starts only when the current operation is ended. While the commands ***OPC** and ***OPC?** are executed immediately, the command ***WAI** does not have any effect. |

### 6.4.8 Interface Parameters

#### *6.4.8.1 Setting the Baud Rate*

**BAUDR<u>x</u> <Y...Y>**

– Setting the baud rate **<Y...Y>** in [Bd] of the serial interface COM **<u>x</u>** (**0-6**) within the following range
for COM Ø:
- **1200**, **2400**, **4800**, **9600**, **19200**, **28800** or **38400**

for COM 1-6:
- **110**, **150**, **300**, **600**, **1200**, **2400**, **4800**, **9600** or **19200**

The numeric argument (in the free format) is rounded up.

– The input and output buffers of the corresponding serial interface COM **<u>x</u>** (**0-6**) are initialized simultaneously.

☞ **Note**

If the value is out of range the error 134 **VAL. OUT OF RANGE** is reported.
Wait approx. 0.5 s after transmitting the interface command **BAUDR0**. Otherwise the next command is received or carried out wrongly.

**BAUDR<u>x</u>?**

– The set baud rate in [Bd] (see below) of the serial interface COM **<u>x</u>** (**0-6**) is filed in the output buffer (COM Ø).

#### *6.4.8.2 Setting the Transmission Parameters*

**DFMT<u>x</u> <PDS>**

– Setting of the parity, the length of the data word and the number of the stop bits of the serial interface COM **<u>x</u>** (**1-6**) with the following format:
- **<PDS>**
  where: **P** - Parity (**N** - none, **E** - paired, **O** - unpaired)
  **D** - Length of data word (**8**, **7**, **6** or **5 b**it)
  **S** - Number of STOP bits (**1** or **2**)

**DFMT<u>x</u>?**

– The set parameters of the communication of the serial interface COM **<u>x</u>** (**0-6**) are filed in the output buffer (COM Ø) with the format **<PDS>**.

#### *6.4.8.3 Setting the Transmission Protocol*

**PROT<u>x</u> <CPD>**

– Selecting the transmission protocol (see 6.2) of the serial interface COM **<u>x</u>** (**0-6**) with the following format:
- **NONE** - without protocol
- **RTS_CTS** - with RTS/CTS protocol

**PROT<u>x</u>?**

– The set transmission protocol **NONE** oder **RTS_CTS** of the serial interface COM **<u>x</u>** (**0-6**) is filed in the output buffer (COM Ø).

### 6.4.9 Interface Commands for COM 1-6

#### *6.4.9.1 Transmission of Data*

**Tx <ABPD>** – Data transmission of the serial interface COM **x** (**1-6**) in the ABPD format (Arbitrary Block Program Data):

- **#<NZD><D><DB>**

  where: **#** - Start signal of data block
  **<NZD>** - ASCII number (no 0) within the range of **49** to **57** (dec.) which defines the number of the following ASCII numbers
  **<D>** - ASCII number within the range of **48** to **57** (dec.) which defines the number of the following binary data blocks with maximum 65,535 bytes
  **<DB>** - binary data within the range of **0** to **255** (dec.), which are transmitted in the following order

  Example: #40004<DB><DB><DB><DB>

**Tx <SPD>** – Data transmission of the serial interface COM **x** (**1-6**) in the SPD format (String Program Data):

- **"<CHARS1>"**
- **'<CHARS2>'**

  where: **"** (dec. 34) - start/stop signal of the character string
  **'** (dec. 39) - start/stop signal of the character string
  **<CHARS1>** - transferred character string
  **<CHARS2>** - transferred character string

☞ **Note** Every character string starts and ends with the start/stop signal **"** or **'**. If several character strings are transmitted consecutively, the start/stop signals appear twice, e. g.: **"**<CHARS1>**""**<CHARS2>**"** or **'**<CHARS1>**''**<CHARS2>**'**.

#### *6.4.9.2 Reception of Data with EOS Final Character*

**Rx?** – A string read by the serial interface **COM x** (**1-6**) is filed in the output buffer (COM Ø).
The string is completed with **EOS** (10 dec.).
The final character **EOS** only may be at the end of the string.

☞ **Note** If the serial interface **COM x** (**1-6**) has not received a character sequence ending with **EOS** the SC 600 awaits reception and communication is interrupted for this period. This state can be dismissed with the RS-232C signal *Break* (see 6.4.1).

### *6.4.9.3 Reception of Binary Data with Defined Length*

**RBx? <Y...Y>** – A defined number of characters read by the serial interface COM **x** (**1-6**) is filed in the output buffer (COM Ø).
The numeric argument **<Y...Y>** is in the range of **0** to **65535** (in the free format) and is rounded up.

☞ **Note** If the value is out of range the error 134 **VAL. OUT OF RANGE** is reported.
Before transmitting the command **RBx? <Y...Y>** it is advisable to query the number of the already received characters with the command **NRCBx?** (see 6.4.9.4).

### *6.4.9.4 Number of Received Characters*

**NRCBx?** – The number of characters which are received via the serial interface COM **x** (**1-6**) but still not read is filed in the output buffer (COM Ø).

☞ **Note** Before transmitting the command **RBx? <Y...Y>** it is advisable to query the number of the already received characters with the command **NRCBx?**.

### *6.4.9.5 Number of Characters not yet Transmitted*

**NNTBx?** – The number of characters not yet transmitted via the serial interface COM **x** (**1-6**) is filed in the output buffer (COM Ø).
The result **<Y...Y>** is in the range of **0** to **65535** (in the free format).

### *6.4.9.6 Auto Detection of Connected Instruments*

**DETECTx?**
– The *digimess* instrument connected at the serial interface COM **x** (**1-6**) is identified and the current baud rate of the *digimess* instrument is set.
– The identification of the recognized *digimess* instrument is shown with the following format:
- **NONE** - no *digimess* instrument was recognized, interface parameters are preserved
- **<Manufacturer, DeviceName>**
  where: **Manufacturer** - name of manufacturer
  **DeviceName** - name of d*igimess* instrument

☞ **Note** The baud rate in [Bd] set in the *digimess* instrument may have only the results **19200**, **9600**, **4800**, **2400** or **1200**.
The processing of the command **DETECTx?** lasts approx. 5 s.

### *6.4.9.7 Transmitting the Break Signal*

**BRK<u>x</u>** – Transmitting the signal *Break* (see 6.4.1) via the serial interface COM **<u>x</u>** (**1-6**) to the connected instrument

## 6.5 Programming Notes

Command line

Single commands can be written concecutively in one command line, the length of which must not exceed 4,096 characters. In case errors occur, the command sequence is ignored and error 181 **INP. BUFFER FULL** is indicated.

Separation characters

Commands and device messages have to be separated by a semicolon:

| ASCII | Character (dec.) |
|---|---|
| ; | 59 |

Final characters

A final character is at the end of every command line.

- During transmission of commands to the SC 600:

| ASCII | Character (dec.) |
|---|---|
| LF | 10 |

- During reception of messages from the SC 600:

| ASCII | Character (dec.) |
|---|---|
| CR + LF | 13 + 10 |

Parameter separators

Certain commands or messages can contain parameters which are separated from the command by a parameter separator.

- During transmission of commands to the SC 600:

| ASCII | Character (dec.) |
|---|---|
| SP | 32 |
| NUL to HT | 0 to 9 |
| VT to US | 11 to 31 |

# 7 Care and Maintenance

| | |
|---|---|
| ⚠ **Warning!** | The SC 600 must be separated from all power sources before maintenance work is carried out and before parts or fuses are repaired or replaced.. |
| Care | Only use a soft wet rag with some soap suds or a soft rinse liquid for cleaning. Avoid acrid cleanser and solvents. |
| Maintenance | The SC 600 does not require special maintenance if it is used and handled correctly.<br>Service work should only be done by trained personnel.<br>In case of repairs it is vital to ensure that the design features of the SC 600 are not changed, resulting in a reduction in operational safety, and that replacement parts match the original ones and are installed properly (original state). |