

Interface protocol CTS control ↔ PC

(Subject to modifications)

1	Introduction - System requirements.....	4
1.1	Serial Interface	4
1.2	Ethernet Interface	4
2	Construction of the protocol.....	5
2.1	Serial Interface	5
2.2	Ethernet Interface	5
3	Commands and Responses	6
3.1	Read time	6
3.1.1	Serial Interface	6
3.1.2	Ethernet Interface	6
3.2	Set time	7
3.2.1	Serial Interface	7
3.2.2	Ethernet Interface	7
3.3	Read analog channels - reading analog set and actual values	8
3.3.1	Serial Interface	8
3.3.2	Ethernet Interface	8
3.3.3	Chamber configuration	9
3.4	Read analog channels - read all analog actual/set values	10
3.4.1	Serial Interface	10
3.4.2	Ethernet Interface	10
3.5	Set analog channels	11
3.5.1	Serial Interface	11
3.5.2	Ethernet Interface	11
3.5.3	Chamber configuration	12
3.6	Specifying the rate of changes (gradients).....	13
3.6.1	Definition rate of changes (gradients)	13
3.6.2	Chamber configuration	13
3.6.3	Set gradient ramp up (e.g. heating)	14
3.6.3.1	Serial Interface	14
3.6.3.2	Ethernet Interface	14
3.6.4	Set gradient ramp down (e.g. cooling)	15
3.6.4.1	Serial Interface	15
3.6.4.2	Ethernet Interface	15
3.6.5	Read adjusted gradient (set value of ramp gradient)	16
3.6.5.1	Serial Interface	16
3.6.5.2	Ethernet Interface	16
3.6.6	Read adjusted final value of the ramp	17
3.6.6.1	Serial Interface	17
3.6.6.2	Ethernet Interface	17
3.6.7	Read ramp parameters	18
3.6.7.1	Serial Interface	18
3.6.7.2	Ethernet Interface	19
3.7	Read chamber state	20
3.7.1	Serial Interface	20
3.7.2	Ethernet Interface	20
3.7.3	Chamber configuration	21
3.7.4	Error number (w)	22

3.8	Set digital channels - chamber Start/Stop.....	23
3.8.1	Serial Interface	23
3.8.2	Ethernet Interface.....	23
3.8.3	Chamber configuration	24
3.9	Read additional digital channels	25
3.9.1	Serial Interface	25
3.9.2	Ethernet Interface.....	26
3.9.3	Chamber configuration	26
3.10	Set additional digital channels	27
3.10.1	Serial Interface	27
3.10.2	Ethernet Interface.....	27
3.10.3	Chamber configuration	28
3.11	Read program state.....	29
3.11.1	Serial Interface	29
3.11.2	Ethernet Interface.....	29
3.12	Start/Stop a program	30
3.12.1	Serial Interface	30
3.12.2	Ethernet Interface.....	30
3.13	Read information of saved test programs	31
3.13.1	Read counter of programs with program number	31
3.13.1.1	Serial Interface	31
3.13.1.2	Ethernet Interface.....	31
3.13.2	Informations about the program numbers.....	32
3.13.2.1	Serial Interface	32
3.13.2.2	Ethernet Interface.....	32
3.14	Read information about the current test program.....	33
3.14.1	Serial Interface	33
3.14.2	Ethernet Interface.....	33
3.15	Read error text	34
3.15.1	Serial Interface	34
3.15.2	Ethernet Interface.....	34
3.16	Read currently errors.....	35
3.16.1	Read the number of all currently errors - Serial Interface	35
3.16.2	Read all currently errors - Serial Interface	36
3.16.3	Read the number and entry of all currently errors - Ethernet Interface.....	37
3.17	Read the lock state of the keyboard	38
3.17.1	Serial Interface	38
3.17.2	Ethernet Interface.....	38
3.18	Lock/unlock the keyboard.....	39
3.18.1	Serial Interface	39
3.18.2	Ethernet Interface.....	39
3.19	Read software version statuses.....	40
3.19.1	Serial Interface	40
3.19.2	Ethernet Interface.....	40
3.20	Read manual limits.....	41
3.20.1	Serial Interface	41
3.20.2	Ethernet Interface.....	41
3.21	Set manual limits	42
3.21.1	Serial Interface	42
3.21.2	Ethernet Interface.....	42

3.22	Read time meter and counter values	43
3.22.1	Time meter	43
3.22.1.1	Serial Interface	43
3.22.1.2	Ethernet Interface	44
3.22.2	Counter	45
3.22.2.1	Serial Interface	45
3.22.2.2	Ethernet Interface	45

1 Introduction - System requirements

1.1 Serial Interface

The ASCII protocol can be used for the serial interfaces RS232, RS485 or USB.
These interface types are only optionally available.

1.2 Ethernet Interface

Ethernet interface of ITC-controller offers possibility of communication to customer's application comparable with the ASCII-Protocol for RS232 Interface.

Communication is based on a TCP/IP-Connection to the fixed port number 1080.

(It is not necessary to define the port in the network settings. The port entered there is only used for communicating with the CID-Pro software.)

In the "system-settings" – "network" menu, the communication parameters for the network connection must be defined.

You will receive the IP address, subnet mask and default gateway from your network administrator.

You need a fixed IP-Address, DHCP is not supported.

The number of simultaneous TCP/IP-connections to the chamber is limited to 5.

You can use the commands described here when the chamber should be controlled or data should be queried by customer's software. This makes sense when this software does further control of test sequence, like stimulate D.U.T. depending on chambers state.

For pure control and documentation of the chamber we suggest CID-pro software. There are comfortable functions to create test cycles and measurement files.

2 Construction of the protocol

2.1 Serial Interface

Interface: RS 232
Baud rate: 19,200 bauds
Format: 8 bits, ODD parity (the parity bit completes the total of 1s to an odd figure)
Data flow control: none
Framing: **'STX' 'Data' 'CHK' 'ETX'**
STX = 0x02
ETX = 0x03
CHK = XOR connection of all data (without STX, ETX nor CHK)
The highest bit (bit 7 resp. MSB) of the data and of the CHK always is 1.
Example: ASC „1“ = DEC 49 or DEC 128 = DEC 177
resp.
HEX 0x31 or HEX 0x80 = HEX 0xB1.
ADR = 0x81 - 0xA0 (address 01 - 32); is set through the software.
Default = 0x81 (address 01).

But for „ETX“ and „STX“, the highest bit (MSB) is always 1.

2.2 Ethernet Interface

The commands over the Ethernet interface can only be successful if the write access of the chamber is released in the menu "System-Settings - Network - Connections".

3.2 Set time

3.2.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 't' ddMMyyhhmmss 'CHK' 'ETX'

't'	ASCII code 0x74 OR 0x80 = 0xF4
ddMMyy	per byte in ASCII OR 0x80 (6 bytes)
hhmmss	per byte in ASCII OR 0x80 (6 bytes)
dd:	Day
MM:	Month
yy:	Year
hh:	Hour
mm:	Minute
ss:	Second

Example: ADR = 1, date = 091112, time = 145535
 String = 0x02 0x81 0xF4 0xB0 0xB9 0xB1 0xB1 0xB1 0xB2
 0xB1 0xB4 0xB5 0xB5 0xB3 0xB5 0xFC 0x03 (17 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 't' ddMMyyhhmmss 'CHK' 'ETX' (read value)

't'	ASCII code 0x74 OR 0x80 = 0xF4
ddMMyy	per byte in ASCII OR 0x80 (6 bytes)
hhmmss	per byte in ASCII OR 0x80 (6 bytes)
dd:	Day
MM:	Month
yy:	Year
hh:	Hour
mm:	Minute
ss:	Second

3.2.2 Ethernet Interface

Command to chamber (PC to CPU):

tddMMyyhhmmss

dd:	Day
MM:	Month
yy:	Year
hh:	Hour
mm:	Minute
ss:	Second

Example: t101112082915 time to set:
 10.11.2012 08:29:15 (13 characters)

Reply of chamber (CPU to PC):

tddMMyyhhmmss
 The received data are replied.

Example: t101112082915 time to set:
 10.11.2012 08:29:15 (13 characters)

Notice: There is a battery backup for the real-time clock. So the clock need not be set after every power ON.

3.3 Read analog channels - reading analog set and actual values

3.3.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'A' x 'CHK' 'ETX'

'A': ASCII code 0x41 OR 0x80 = **0xC1**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.3.3 - Chamber configuration)

Example: ADR = 1, channelno = 0 (temperature channel)
 String = 0x02 0x81 0xC1 0xB0 0xF0 0x03 (6 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'A' x _yyy.y_zzz.z 'CHK' 'ETX' (read value)

'A': ASCII code 0x41 OR 0x80 = **0xC1**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.3.3 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 yyy.y: Actual value - format XXX.X (-XX.X for negative values)
 per byte in ASCII OR 0x80
 zzz.z: Set value - format XXX.X (-XX.X for negative values)
 per byte in ASCII OR 0x80

Example: ADR = 1, channelno = 0 (temperature channel),
 actualvalue = -14.5 °C, setvalue = -13.8 °C
 String = 0x02 0x81 0xC1 0xB0 0xA0 0xAD 0xB1 0xB4 0xAE 0xB5 0xA0
 0xAD 0xB1 0xB3 0xAE 0xB8 0xFA 0x03 (18 bytes)

Notice: If several channels are available, each one must be read separately.

3.3.2 Ethernet Interface

Command to chamber (PC to CPU):

Ax

x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.3.3 - Chamber configuration.

Example: A0 (Read chamber temperature, 2 characters)

Reply of chamber (CPU to PC):

Ax_yyy.y_zzz.z

x: Channel number see above (cf. chapter 3.3.3 - Chamber configuration)
 _: blank
 yyy.y: Actual value of channel
 zzz.z: Set value of channel

Example: A0 020.4 023.0 (actual temperature: 20,4°C, set value: 23,0°C,
 14 characters)

Notice:

- If chamber replies only with one number, this is the channel No., but the asked channel is not present. (invalid Channel No., because Channel No. CID of controller configuration is not > 0).
- If you use ramps (s. Command ,u' and ,d') you always get back the actual setpoint. (In earlier controllers you got back the ending point of the ramp.)

3.3.3 Chamber configuration

Example of a chamber configuration C-70/350:

Value Ax	Channel No CID	Channel	Limits
A0	1	Temperature in [°C]	min. -75.00 [°C], max. 185.00 [°C]
A1	2	Humidity in [%rH]	min. 0.00 [%rH], max. 98.00 [%rH]
A2	3	Water storage in [l]	min. 0.00 [l], max. 15.00 [l]
A3	4	TempSupplyAir in [°C]	min. -75.00 [°C], max. 185.00 [°C]
A4	5	TempExhAir in [°C]	min. -75.00 [°C], max. 185.00 [°C]
A5	6	HumidSupplAir in [%rH]	min. 5.00 [%rH], max. 98.00 [%rH]
A6	7	HumidExhAir in [%rH]	min. 5.00 [%rH], max. 98.00 [%rH]

Notice: You can read out max. 16 analog channels!!!

3.4 Read analog channels - read all analog actual/set values

Command available from ITC version 3.19 (delivery date: 14.08.2019)

3.4.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'A' a 'CHK' 'ETX'

'A' ASCII code 0x41 OR 0x80 = **0xC1**
a: all channels - one byte: ASCII code 0x61 OR 0x80 = **0xE1**
(cf. chapter 3.3.3 - Chamber configuration)

Example: ADR = 1, (all channels)
String = 0x02 0x81 0xC1 0xE1 0xA1 0x03 (6 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'A' xx_yyy.y_zzz.z/xx_yyy.y_zzz.z/... 'CHK' 'ETX' (read value)

'A': ASCII code 0x41 OR 0x80 = **0xC1**
xx: channelNo - two bytes in ASCII OR 0x80
(cf. chapter 3.3.3 - Chamber configuration)
_: blank = 0x20 OR 0x80 = 0xA0
yyy.y: Actual value - format XXX.X (-XX.X for negative values)
per byte in ASCII OR 0x80
zzz.z: Set value - format XXX.X (-XX.X for negative values)
per byte in ASCII OR 0x80
/: Separator = 0x2F OR 0x80 = 0xAF
Example: A00 040.0 030.0/01 041.....
String = 0x02 0x81 0xC1 0xB0 0xB0 0xA0 0xB0 0xB4 0xB0 0xAE 0xB0 0xA0
0xB0 0xB3 0xB0 0xAE 0xB0 0xAF 0xB0 0xB1 0xA0 0xB0 0xB4 0xB1 ...

Notice: You can read out max. 16 analog channels!

3.4.2 Ethernet Interface

Command to chamber (PC to CPU):

Aa

a: All channels 0...n
(cf. chapter 3.3.3 - Chamber configuration)

Example: Aa (Read all chamber channels, 2 characters)

Reply of chamber (CPU to PC):

Axx_yyy.y_zzz.z/xx_yyy.y_zzz.z/...

xx: Channel index (cf. chapter 3.3.3 - Chamber configuration)
_: blank
yyy.y: Actual value - format XXX.X (-XX.X for negative values)
zzz.z: Set value - format XXX.X (-XX.X for negative values)
/: Separator = 0x2F OR 0x80 = 0xAF

Example: A00_020.4_023.0/01_080.7_014.8/
(actual temperature = 20,4°C, set temperature = 23,0°C,
actual humidity = 80,7%, set humidity = 14,8%)

Notice: You can read out max. 16 analog channels!

3.5 Set analog channels

3.5.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'a' x_yyy.y 'CHK' 'ETX'

'a' ASCII code 0x61 OR 0x80 = **0xE1**

x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.5.3 - Chamber configuration)

_: blank = 0x20 OR 0x80 = 0xA0

yyy.y: Set value - format XXX.X (-XX.X for negative values)
 per byte in ASCII OR 0x80

Example: ADR = 1, channelno = 0 (temperature channel), value = -14.5 °C

String = 0x02 0x81 0xE1 0xB0 0xA0 0xAD 0xB1 0xB4 0xAE 0xB5 0xC3 0x03
 (12 bytes)

Notice: If several channels are available, each one must be set separately.

Reply of chamber (CPU to PC):

'STX' 'ADR' 'a' 'CHK' 'ETX'

'a' ASCII code 0x61 OR 0x80 = **0xE1**

3.5.2 Ethernet Interface

Command to chamber (PC to CPU):

ax_yyy.y

x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.5.3 - Chamber configuration.

_: blank

yyy.y: Set value of channel

Example: a0 -12.5 (change temperature set point to -12.5°C , 8 characters)

Reply of chamber (CPU to PC):

a

Example: a (1 character)

Notice:

- If chamber replies only with one number, this is the channel No., but the asked channel is not present. (invalid Channel No., because Channel No. CID of controller configuration is not > 0).
- set point form command are limited to channel range
- The ramp control is activated if the ramp rate setting is < 500 K/min when this instruction is read. (The ramp only begins when the system starts.)
Otherwise, the new target value is set immediately, even if the ramp rate setting instructions are not in use.

3.5.3 Chamber configuration

Example of a chamber configuration C-70/350:

Command ax	Channel No CID	Channel	Limits
a0	1	Temperature in [°C]	min. -75.00 [°C], max. 185.00 [°C]
a1	2	Humidity in [%rH]	min. 0.00 [%rH], max. 98.00 [%rH]

Notice: The modify of the set values for standard chambers make sense only for the first two channels and can even be overwritten by the chamber controller.

3.6 Specifying the rate of changes (gradients)

3.6.1 Definition rate of changes (gradients)

General: The value to be inputted in the commands described below has the unit of measurement K/min. The system will run with this rate of change using the set target value.

Attention: The gradient that is set will remain in effect in the controls until a new value is set. If a run is to be carried out with the maximum target value stepping range then the gradient is to be set to a maximum value of 999.9 K/min.

In order to carry out a ramp using a target value, input the change speed first and then input the desired final value as target value. When the final value is reached, the system will continue to run with this target value until a new value is inputted.

With the ITC controller, the actual target value in the context of the ramp will always be outputted when the command to read the analogue values is given. The command 'E' (see below) is to be used to query the set target value of the ramp.

Note: The value of the gradient can also be inputted in a different format. If, for example, more precise values are necessary for the gradient then values can be inputted with two decimal places.

Example: 00.05 → 0.05 K/min
23.45 → 23.45 K/min

Notice: Only change rates > 0.01 are accepted.

If the system is stopped (**Start/Stop button or instruction s1_0**), the ramp function is terminated and the end value of the ramp is set to the new target value.

If the system is interrupted (**Pause button or instruction s3_0**), the ramp function is interrupted (target values are not changed); the ramp continues when the pause is ended.

3.6.2 Chamber configuration

Example of a chamber configuration C-70/350:

Command/ Value u/d/U/E/Rx	Channel No CID	Channel	Limits
u/d/U/E/R0	1	Temperature in [°C]	min. -75.00 [°C], max. 185.00 [°C]
u/d/U/E/R1	2	Humidity in [%rH]	min. 0.00 [%rH], max. 98.00 [%rH]

Notice: On standard systems, setting target values typically only makes sense on the first two channels, and can even be overwritten by the system control.

3.6.3 Set gradient ramp up (e.g. heating)

3.6.3.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'u' x_yyy.y 'CHK' 'ETX'
 'u' ASCII code 0x75 OR 0x80 = **0xF5**
 x: channelNo - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 yyy.y: Set value - format XXX.X
 per byte in ASCII OR 0x80

Notice: If several channels are available, each one must be set separately
 The value for the gradient is always a **positive one**.

Reply of chamber (CPU to PC):

'STX' 'ADR' 'u' 'CHK' 'ETX' (read value)
 'u' ASCII code 0x75 OR 0x80 = **0xF5**

3.6.3.2 Ethernet Interface

Command to chamber (PC to CPU):

ux_yyy.y
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.
 _: blank
 yyy.y: Set value set for ramping up in fixed format in K/min

Example: u1 005.0 (8 characters)

Notice: If several channels are available, each one must be set separately
 The value for the gradient is always a **positive one**.

Reply of chamber (CPU to PC):

u

Example: u (1 character)

3.6.4 Set gradient ramp down (e.g. cooling)

3.6.4.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'd' x_yyy.y 'CHK' 'ETX'
 'd' ASCII code 0x64 OR 0x80 = **0xE4**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 yyy.y: Set value - format XXX.X
 per byte in ASCII OR 0x80

Notice: If several channels are available, each one must be set separately
 The value for the gradient is always a **positive one**.

Reply of chamber (CPU to PC):

'STX' 'ADR' 'd' 'CHK' 'ETX' (read value)
 'd' ASCII code 0x64 OR 0x80 = **0xE4**

3.6.4.2 Ethernet Interface

Command to chamber (PC to CPU):

dx_yyy.y
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.
 _: blank
 yyy.y: Set value set for ramping down in fixed format in K/min

Example: d1 005.0 (8 characters)

Notice: If several channels are available, each one must be set separately
 The value for the gradient is always a **positive one**.

Reply of chamber (CPU to PC):

d

Example: d (1 character)

3.6.5 Read adjusted gradient (set value of ramp gradient)

3.6.5.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'U' x 'CHK' 'ETX'
 'U' ASCII code 0x55 OR 0x80 = **0xD5**
 x: channelNo - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'U' x_yyy.y_zzz.z 'CHK' 'ETX' (read value)
 'U' ASCII code 0x55 OR 0x80 = **0xD5**
 x: channelNo - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 yy.y: gradientUp - value set for ramping up in K/min
 per byte in ASCII OR 0x80
 zzz.z: gradientDown - value set for ramping down in K/min
 per byte in ASCII OR 0x80

Notice: If several channels are available, each one must be read separately
 The value for the gradient is always a **positive one**.

3.6.5.2 Ethernet Interface

Command to chamber (PC to CPU):

Ux
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.

Example: U1 (2 characters)

Reply of chamber (CPU to PC):

Ux_yyy.y_zzz.z
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.
 _: blank
 yy.y: value set for ramping up in K/min
 _: blank
 zzz.z: value set for ramping down in K/min

Example: U1 005.0 003.0 (14 characters)

Notice: The value for raming down is also a positive value. This value specifies the changing rate of the set points independent of the chambers has enough power to follow these values.

3.6.6 Read adjusted final value of the ramp

3.6.6.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'E' x 'CHK' 'ETX'
 'E' ASCII code 0x45 OR 0x80 = **0xC5**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'E' x_yyy.y 'CHK' 'ETX' (read value)
 'E' ASCII-Code 0x45 OR 0x80 = **0xC5**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)
 _.: blank = 0x20 OR 0x80 = 0xA0
 yyy.y: final Value - final value of the ramp
 per byte in ASCII OR 0x80

Notice: If several channels are available, each one must be read separately

3.6.6.2 Ethernet Interface

Command to chamber (PC to CPU):

Ex
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.

Example: E1 (2 characters)

Reply of chamber (CPU to PC):

Ex_yyy.y
 x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.6.2 - Chamber configuration.
 _.: blank
 yyy.y: final value of ramp in fixed format

Example: E1 -40.0 (8 characters)

Notice: If no ramp ride has been triggered by changing the setpoint, the value 0.0 is returned.

3.6.7 Read ramp parameters

3.6.7.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'R' x 'CHK' 'ETX'

'R' ASCII code 0x52 OR 0x80 = **0xD2**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)

Example: ADR = 1, channel 0
 String = 0x02 0x81 0xD2 0xB0 0xE3 0x03 (6 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'R' x_ab_xxxx.xx_yyyy.yy_zzzz.zz 'CHK' 'ETX' (read value)

'R' ASCII code 0x52 OR 0x80 = **0xD2**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.6.2 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 a: ramp management active: ,1'= active; ,0'=inactive
 b: ramp management runs: ,1' = runs; ,0' = does not run
 because of Pause or Error
 _: blank = 0x20 OR 0x80 = 0xA0
 xxxx.xx: value set for ramping up in K/min in fixed format
 _: blank = 0x20 OR 0x80 = 0xA0
 yyyy.yy: value set for ramping down in K/min in fixed format
 _: blank = 0x20 OR 0x80 = 0xA0
 zzzz.zz: final value of ramp in fixed format
 all bytes in ASCII OR 0x80

Notice: The reason for the new data set is the enhanced formatting and the combined supply of ramp information.

Example:
 String = 0x02 0x81 0xD2 0xB0 0xA0 0xB0 0xB0 0xA0 0xB9 0xB9 0xB9 0xB9 0xAE
 0xB9 0xB0 0xA0 0xB9 0xB9 0xB9 0xB9 0xAE 0xB9 0xB0 0xA0 0xB0 0xB0
 0xB3 0xB0 0xAE 0xB0 0xB0 0x80 0xCE 0x03 (34 bytes)
 ADR = 1
 R0
 not active, does not run
 ramp up 9999.90 K/min
 ramp down 9999.90 K/min
 final value 0030.00 °C

3.6.7.2 Ethernet Interface

Command to chamber (PC to CPU):

Rx

x: Mapping of channel numbers could be seen in chapter 3.6.2 - Chamber configuration.

Example: R0 (2 characters)

Reply of chamber (CPU to PC):

Rx_ab_xxxx.xx_yyyy.yy_zzzz.zz

x: Mapping of channel numbers could be seen in chapter 3.6.2 - Chamber configuration.

_: blank

a: ramp management active: ,1'= active; ,0'=inactive

b: ramp management runs: ,1' = runs; ,0' = does not run because of Pause or Error

_: blank

xxxx.xx: value set for ramping up in K/min in fixed format

_: blank

yyyy.yy: value set for ramping down in K/min in fixed format

_: blank

zzzz.zz: final value of ramp in fixed format

Example: R0 11 0005.00 0003.50 -010.00 (30 characters)

3.7 Read chamber state

3.7.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'S' 'CHK' 'ETX'
 'S' ASCII code 0x53 OR 0x80 = **0xD3**

Example: ADR = 1
 String = 0x02 0x81 0xD3 0xD2 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'S' xyzzzzzw 'CHK' 'ETX' (read value)
 'S' ASCII code 0x53 OR 0x80 = **0xD3**
 xyzzzzzw: '0' = „OFF“; '1' = „ON“ per byte in ASCII OR 0x80 (0xB0 or 0xB1)
 Mapping of channel numbers could be seen in
 chapter 3.7.3 - Chamber configuration and 3.7.4 - Error number (w).

Example: ADR = 1, x = 1, y = 0, z1 = 1, z2 = 1, z3 = 0, z4 = 0, z5 = 0, z6 = 0, w = 0
 String = 0x02 0x81 0xD3 0xB1 0xB0 0xB1 0xB1 0xB0 0xB0 0xB0 0xB0
 0xB0 0xE3 0x03 (14 bytes)

3.7.2 Ethernet Interface

Command to chamber (PC to CPU):

S

Reply of chamber (CPU to PC):

Sxyzzzzzw
 x: Start: '0' (chamber stopped), or '1' (chamber is running)
 y: Error: '0' (no Error present), or '1' (error pending, Error number see w)
 z: List of 6 digital channels. '0' (function OFF), '1' (function ON). Which
 channels are listed see chapter 3.7.3 - Chamber configuration. The list
 starts with Indicator channels. If there are less than 6 Indicators
 Softkey channel follows. If sum of both is less than 6, remaining digits
 are unused. There are always 6 digits replied
 w: Error number, when Error digit (y) is set this is the number of pending
 error. Meaning of the error number is found in Error report in
 documentation. If there are multiple errors pending the one appeared
 first is given, see chapter 3.7.4 - Error number (w).

Example: S101101000 (Chamber started, no error, Temper On, humidity On,
 Additional dehumidification Off, DigOut1 ON, DigOut2 OFF, Channel 6
 unused, Error number 0 (no error), 10 characters)

Notice:

- Order of Indicators and Softkeys is given by ascending order of "Channel No. CID" of both lists in controller configuration, see chapter 3.7.3 - Chamber configuration.
- Enabling bits are replied, e.g. if a function is switched on but not released a '0' is replied.
 Example: DigOut1 is set but Chamber is stopped. (This is related to blinking channel in handset.)

3.7.3 Chamber configuration

Example of a chamber configuration C-70/350:

Pos.	Value	Channel No CID	Channel	Type	Meaning
x	'0' or '1' 0x30 or 0x31	-	START / STOP	SYSTEM	Chamber ON/OFF?
y		-	COLLECTMALFUNCTION	SYSTEM	Error?
z1		1	PAUSE resp Temperature	Indicator 1	Chamber interrupt?
z2		2	Humidity	Indicator 2	State on/off
z3		3	Dew point >7°C	Indicator 3	State on/off
z4		4	Dew point <7°C	Indicator 4	State on/off
z5		1	Deep dehumidity	Softkey 1	State on/off
z6		2	RegSupplyAir	Softkey 2	State on/off
w	see table Chapter 3.7.4		ERROR NUMBER	SYSTEM	

3.7.4 Error number (w)

Example of a chamber configuration C-70/350:

Value	No	Errortext	Type
0x01	01	Add water	Warning reports
0x02	02	Upper temperature tolerance band	
0x03	03	Lower temperature tolerance band	
0x04	04	Upper humidity tolerance band	
0x05	05	Lower humidity lower tolerance band	
0x06	06	De-sludge water bath	
0x31 - '1'	01	Min. temperature limit 08-B1	Error reports
0x32 - '2'	02	Max. temperature limit 08-B1	
0x33 - '3'	03	Temp. limiter 1 test space 01-F1.1	
0x34 - '4'	04	Thermal contact test space fan 02-F2.1	
0x35 - '5'	05	Max test specimen protection 09-A1	
0x36 - '6'	06	Pre-cooling overpressure 03-B50	
0x37 - '7'	07	Cooling overpressure 03-B40	
0x38 - '8'	08	Min. humidity 08-B2	
0x39 - '9'	09	Max. humidity 08-B2	
0x3a - ':'	10	Humidity sensor 08-B2	
0x3b - ';'	11	Lack of water humidity 07-B80	
0x3c - '<'	12	Therm. cont. condenser fan 03-F5.1	
0x3d - '='	13	Boiling pressure sensor 03-B60	
0x3e - '>'	14	Condenser pressure sensor C 03-B41	
0x3f - '?'	15	Pt100 exhaust air 08-B1.1	
0x40 - '@'	16	Pt100 supply air 08-B1.2	
0x41 - 'A'	17	Pt100 water bath 07-B4	
0x42 - 'B'	18	Float water supply 07-B81	
0x43 - 'C'	19	Pt100 moveable 08-B15	
0x46 - 'F'	22	Pt100 suction gas PC 03-B19	
0x47 - 'G'	23	Pt100 suction gas C 03-B13	
0x48 - 'H'	24	Pt100 compressed gas C 03-B10	
0x4a - 'J'	26	Suction gas temperature PC 03-B19	
0x4b - 'K'	27	Suction gas temperature C 03-B13	
0x4c - 'L'	28	Compr.gas temperature C 03-B10	
0x4e - 'N'	30	Pre-cooling negative pressure 03-B53	
0x4f - 'O'	31	Cooling negative pressure 03-B43	
0x52 - 'R'	34	SuctPre-coolRefrCycle 03-B53	
0x53 - 'S'	35	Suct.cool.refrig.cycle 03-B43	
0x5b - 'I'	43	Float water bath 07-B80	
0x5c - 'V'	44	Pt100 suction steam C 03-B12	
0x5d - 'J'	45	Pt100 suction steam PC 03-B18	
0x5e - '^'	46	Boiling pressure sensor C 03-B43	
0x5f - '_'	47	Boiling pressure sensor PC 03-B53	
0x62 - 'b'	50	Circuit breaker power supply 00-Q1	
0x63 - 'c'	51	Pre-cooling circuit	

3.8 Set digital channels - chamber Start/Stop

3.8.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 's' x_y 'CHK' 'ETX'

's' ASCII code 0x73 OR 0x80 = **0xF3**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.8.3 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 y: Value to set: „1“ or „0“ correspond to ON or OFF
 per byte in ASCII OR 0x80

Examples: Chamber start: ADR = 1, chamber on = 1 (x = 1)
 Command: **s1 1 (Switch On chamber, 4 characters)**
 String = 0x02 0x81 **0xF3 0xB1** 0xA0 **0xB1** 0xD2 0x03 (8 bytes)

Chamber stop: ADR = 1, Anlage on = 0 (x = 1)
 Command: **s1 0 (Switch Off chamber, 4 characters)**
 String = 0x02 0x81 **0xF3 0xB1** 0xA0 **0xB0** 0xD3 0x03 (8 bytes)

Receipt error: ADR = 1, receipt collective failure = 0 (x = 2)
 String = 0x02 0x81 0xF3 0xB2 0xA0 0xB0 0xD0 0x03 (8 bytes)

Command: **s3 0 (Pause chamber, 4 characters)**
 Command: **s3 1 (Continue chamber, 4 characters)**

Reply of chamber (CPU to PC):

'STX' 'ADR' 's' x 'CHK' 'ETX'

's' ASCII code 0x73 OR 0x80 = **0xF3**

3.8.2 Ethernet Interface

Command to chamber (PC to CPU):

sx_y

x: Mapping of channel numbers could be seen in
 chapter 3.8.3 - Chamber configuration.
 Settable channels are the softkeys.

_: blank

y: Value to set: „1“ or „0“ correspond to ON or OFF

Examples: **s1 1 (Switch On chamber, 4 characters)**
s1 0 (Switch Off chamber, 4 characters)
s2 0 (Receipt error)
s3 0 (Pause chamber, 4 characters)
s3 1 (Continue chamber, 4 characters)
 s5 1 (supposed there are 2 indicator channels softkey with
 Channel No. CID = 1 is set)

Reply of chamber (CPU to PC):

sx

x: Mapping of channel numbers could be seen in
 chapter 3.8.3 - Chamber configuration.

Example: S1 (2 characters)

3.8.3 Chamber configuration

Example of a chamber configuration C-70/350:

Command sx	Channel No CID	Channel	Type	Meaning
s1	-	START / STOP	SYSTEM	Chamber turn on/off
s2	-	COLLECTMALFUNCTION	SYSTEM	Receipt Error
s3	1	PAUSE	Indicator 1	Chamber interrupt
s4	2	Humidity	Indicator 2	not changeable
s5	3	Dew point >7°C	Indicator 3	not changeable
s6	4	Dew point <7°C	Indicator 4	not changeable
s7	1	Deep dehumidity	Softkey 1	Softkey can be set!
s8	2	RegSupplyAir	Softkey 2	Softkey can be set!
s9	3	Dig. output 1	Softkey 3	Softkey can be set!
s:	4	Dig. output 2	Softkey 4	Softkey can be set!
s;	5	De-sludge	Softkey 5	Softkey can be set!

Notice: You can set/reset max. 12 (15-3) digital channels!!!

3.9 Read additional digital channels

3.9.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'O' 'CHK' 'ETX'
 'O' ASCII code 0x4F OR 0x80 = **0xCF**

Example: ADR = 1
 String = 0x02 0x81 0xCF 0xCE 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'O' xyzm...ms...s 'CHK' 'ETX' (read value)
 'O' ASCII code 0x4F OR 0x80 = **0xCF**
 xyz: Control channels
 m..m: Indicator channels according controllers configuration
 s..s: Softkeys channels according controllers configuration
 see chapter 3.9.3 - Chamber configuration.

The length of the replied string depends on the configuration of the chamber. All configured digital channels, flags and softkeys are reported. When function active a '1' otherwise a '0' is replied.

Example: ADR = 1

Command to chamber (PC to CPU):
 String = 0x02 0x81 0xCF 0xCE 0x03 (5 bytes)

Reply of chamber (CPU to PC):
 String = 0x02 0x81 0xCF 0xB0 0xB1 0xB0 0xB0 0xB0 0xB1 0xB0 0xB0 0xB0
 0xB0 0xB0 0xB0 0xB0 0xB0 0xB0 0xCE 0x03 (19 bytes)

3.9.2 Ethernet Interface

Command to chamber (PC to CPU):

O

Example: O (1 character)

Reply of chamber (CPU to PC):

Oxyzm...ms...s

x: Start, '1' for chamber started, '0' for chamber stopped
 y: Error, '1' for error present, '0' for no error
 z: Pause, '1' for continue chamber, '0' for interrupt chamber
 m..m: Indicator channels according controllers configuration
 s..s: Softkeys channels according controllers configuration
 see chapter 3.9.3 - Chamber configuration.

Example: O10011010 (Chamber started, no error, 2 Indicators both ON, 3 softkeys second one switched ON, length variable)

Notice:

- Order of Indicators and Softkeys is given by ascending order of "Channel No. CID" of both lists, see chapter 3.9.3 - Chamber configuration.
- Enabling bits are replied, e.g. if a function is switched on but not released a '0' is replied. Example: DigOut1 is set but Chamber is stopped. (This is related to blinking channel in handset.)

3.9.3 Chamber configuration

Example of a chamber configuration C-70/350:

Value	Channel No CID	Channel	Type	Meaning
x	-	START / STOP	SYSTEM	Chamber ON/OFF?
y	-	COLLECTMALFUNCTION	SYSTEM	Error?
z	-	PAUSE	SYSTEM	Chamber interrupt?
m0	1	Temperature	Indicator 1	State on/off
m1	2	Humidity	Indicator 2	State on/off
m2	3	Dew point >7°C	Indicator 3	State on/off
m3	4	Dew point <7°C	Indicator 4	State on/off
s0	1	Deep dehumidity	Softkey 1	State on/off
s1	2	RegSupplyAir	Softkey 2	State on/off
s2	3	Dig. output 1	Softkey 3	State on/off
s3	4	Dig. output 2	Softkey 4	State on/off
s4	5	De-sludge	Softkey 5	State on/off

3.10 Set additional digital channels

3.10.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'o' xx_y 'CHK' 'ETX'

'o': ASCII code 0x6F OR 0x80 = **0xEF**
 xx: Number of channel according list at command 'O' counting from zero.
 In ASCII-Code OR 0x80
 (cf. chapter 3.10.3 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 y: Value to set: „1“ or „0“ correspond to ON or OFF

Example: xx = 09 turn on: ADR = 1
 xx 10er = '0' = 0x30 OR 0x80 = 0xB0
 xx 1er = '9' = 0x39 OR 0x80 = 0xB9
 String = 0x02 0x81 0xEF 0xB0 0xB9 0xA0 0xB1 0xF6 0x03 (9 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'o' xx 'CHK' 'ETX'

'o': ASCII code 0x6F OR 0x80 = **0xEF**
 xx: Number of channel according list at command 'O' counting from zero.
 In ASCII-Code OR 0x80
 (cf. chapter 3.10.3 - Chamber configuration)

Example: xx = 09 turn on: ADR = 1, compressed air = 1
 String = 0x02 0x81 0xEF 0xB0 0xB9 0xE7 0x03 (7 bytes)

3.10.2 Ethernet Interface

Command to chamber (PC to CPU):

oxx_y

xx: Channel No. 2 digits as decimal number
 see chapter 3.10.3 - Chamber configuration
 blank
 y: Value to set: ,0' for function OFF, ,1' for function ON

Example: o09 1 (5 characters)
 (For a chamber with 2 indicators softkey with channel No. CID = 5
 is switched ON)

Reply of chamber (CPU to PC):

oxx

xx: Channel No. 2 digits as decimal number

Example: o09 (3 characters)

Notice:

- You can use this command to switch softkey channels which are not reachable over S-command. Start/stop of chamber is not possible.

3.10.3 Chamber configuration

Example of a chamber configuration C-70/350:

Command oxx	Channel No CID	Channel	Type	Meaning
o00	-	START / STOP	SYSTEM	not changeable
o01	-	COLLECTMALFUNCTION	SYSTEM	not changeable
o02	-	PAUSE	SYSTEM	not changeable
o03	1	Temperature	Indicator 1	not changeable
o04	2	Humidity	Indicator 2	not changeable
o05	3	Dew point >7°C	Indicator 3	not changeable
o06	4	Dew point <7°C	Indicator 4	not changeable
o07	1	Deep dehumidity	Softkey 1	Softkey can be set
o08	2	RegSupplyAir	Softkey 2	Softkey can be set
o09	3	Dig. output 1	Softkey 3	Softkey can be set
o10	4	Dig. output 2	Softkey 4	Softkey can be set
o11	5	De-sludge	Softkey 5	Softkey can be set

3.11 Read program state

3.11.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'P' 'CHK' 'ETX'
 'P' ASCII code 0x50 OR 0x80 = **0xD0**

Example: ADR = 1
 String = 0x02 0x81 0xD0 0xD1 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'P' xxx 'CHK' 'ETX' (read value)
 'P' ASCII code 0x50 OR 0x80 = **0xD0**
 xxx: actual program number (3 ASCII characters, 001-099)
 000 = no program currently running

Example: ADR = 1, program 1 runs
 String = 0x02 0x81 0xD0 0xB0 0xB0 0xB1 0xE0 0x03 (8 bytes)

3.11.2 Ethernet Interface

Command to chamber (PC to CPU):

P

Example: P (1 character)

Reply of chamber (CPU to PC):

Pxxx
 xxx: Number of currently running program, always in 3 digits,
 Program number 000 stands for program mode OFF

Example: P000 (No program running, 4 characters)
 P010 (Program No 10 is active, 4 characters)

3.12 Start/Stop a program

3.12.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'p' xxx 'CHK' 'ETX'

'p' ASCII code 0x70 OR 0x80 = **0xF0**
 xxx: number of the program to be started (001-099).
 000 = stop the program

Examples: ADR = 1, start program 1
 String = 0x02 0x81 0xF0 0xB0 0xB0 0xB1 0xC0 0x03 (8 bytes)

ADR = 1, stop program
 String = 0x02 0x81 0xF0 0xB0 0xB0 0xB0 0xC1 0x03 (8 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'p' xxx 'CHK' 'ETX' (read value)

'p' ASCII code 0x70 OR 0x80 = **0xF0**
 xxx: number of the program to be started (001-099).
 000 = stop the program

Examples: ADR = 1, start program 1
 String = 0x02 0x81 0xF0 0xB0 0xB0 0xB1 0xC0 0x03 (8 bytes)

3.12.2 Ethernet Interface

Command to chamber (PC to CPU):

pxxx

xxx: Number of program (3 digits),
 Program number 000 means stop program,

Example: p001 1 (4 characters)

Reply of chamber (CPU to PC):

pxxx

xxx: Number of program (3 digits),
 Program number 000 means stop program,

Example: p001 1 (4 characters)

3.13 Read information of saved test programs

3.13.1 Read counter of programs with program number

3.13.1.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'M01' 'CHK' 'ETX'

'M' ASCII code 0x4D OR 0x80 = **0xCD**
 01: Command parameter - two-digit in ASCII OR 0x80

Reply of chamber (CPU to PC):

'STX' 'ADR' 'M01_xxx;Nr1;Nr2;NrN;' 'CHK' 'ETX' (variable length - read value)

'M' ASCII code 0x4D OR 0x80 = **0xCD**
 01: Command parameter - two-digit in ASCII OR 0x80
 _: blank = 0x20 OR 0x80 = 0xA0
 xxx: Number of all saved programs, all bytes in ASCII OR 0x80
 ; Seperator = 0x3B OR 0x80 = 0xBB
 Nr1..NrN: Counter of the program numbers (three-digit), in ASCII OR 0x80

3.13.1.2 Ethernet Interface

Command to chamber (PC to CPU):

M01

01: Command parameter - two-digit

Example: M01 (3 characters)

Reply of chamber (CPU to PC):

M01_xxx;Nr1;Nr2;NrN; (variable length - read value)

01: Command parameter - two-digit
 _: blank
 xxx: Number of all saved programs
 ; Seperator
 Nr1..NrN: Counter of the program numbers (three-digit)

Example: M01 002;001;002; (16 characters)

3.13.2 Informations about the program numbers

3.13.2.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'M02_xxx' 'CHK' 'ETX'

'M'	ASCII code 0x4D OR 0x80 = 0xCD
02:	Command parameter - two-digit in ASCII OR 0x80
_:	blank = 0x20 OR 0x80 = 0xA0
xxx:	Program number, all bytes in ASCII OR 0x80

Reply of chamber (CPU to PC):

'STX' 'ADR' 'M02_xxx;Name;Lines;Runtime;' 'CHK' 'ETX' (variable length - read value)

'M'	ASCII code 0x4D OR 0x80 = 0xCD
02:	Command parameter - two-digit in ASCII OR 0x80
_:	blank = 0x20 OR 0x80 = 0xA0
xxx:	Program number, all bytes in ASCII OR 0x80
;	Seperator = 0x3B OR 0x80 = 0xBB
Name:	Program name
Lines:	Number of lines in the program
Runtime:	Program runtime in min. (without waitfunctions)

3.13.2.2 Ethernet Interface

Command to chamber (PC to CPU):

M02_xxx

02:	Command parameter - two-digit
_:	blank
xxx:	Program number

Example: M02 001 (7 characters)

Reply of chamber (CPU to PC):

M02_xxx;Name;Lines;Runtime; (variable length - read value)

02:	Command parameter - two-digit
_:	blank
xxx:	Program number
;	Seperator
Name:	Program name
Lines:	Number of lines in the program
Runtime:	Program runtime in min. (without waitfunctions)

Example: M02 001;Prog.01;015;1440; (25 characters)

3.14 Read information about the current test program

Command available from ITC version 3.19 (delivery date: 14.08.2019)

3.14.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'D' xxx 'CHK' 'ETX'

'D' ASCII code 0x44 OR 0x80 = **0xC4**
 xxx: Current program number - three digits in ASCII OR 0x80

Example: Program = 001
 String = 0x02 0x81 0xC4 0xB0 0xB0 0xB1 0xF4 0x03 (8 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'D' xxx;Line;Wait;ProgRun;RuntimeProg;RemaintimeLine 'CHK' 'ETX'

'D' ASCII code 0x44 OR 0x80 = **0xC4**
 xxx: Current program number - three-digit in ASCII OR 0x80
 ';': Seperator = 0x3B OR 0x80 = 0xBB
 Line: Current program line
 Wait: Wait function active = 1, inactive = 0
 ProgRun: Program is running = 1, program is not running = 0
 RuntimeProg: Current runtime in seconds
 RemaintimeLine: Remaining runtime of the current program line in seconds

Example: D001;001;0;1;00000063;00000537
 String = 0x02 0x81 0xC4 0xB0 0xB0 0xB1 0xBB 0xB0 0xB0 0xB1 0xBB 0xB0
 0xBB 0xB1 0xBB 0xB0 0xB0 0xB0 0xB0 0xB0 0xB6 0xB3 0xBB
 0xB0 0xB0 0xB0 0xB0 0xB0 0xB5 0xB3 0xB7 0xFB 0x03

3.14.2 Ethernet Interface

Command to chamber (PC to CPU):

Dxxx

xxx: Current program number - three digits

Example: D001 (4 characters)

Reply of chamber (CPU to PC):

Dxxx; ;Line;Wait;ProgRun;RuntimeProg;RemaintimeLine (variable length)

xxx: Current program number - three-digit
 ';': Seperator
 Line: Current program line
 Wait: Wait function active = 1, inactive = 0
 ProgRun: Program is running = 1, program is not running = 0
 RuntimeProg: Current runtime in seconds
 RemaintimeLine: Remaining runtime of the current program line in seconds

Example: D001;001;0;1;00001440;00002646

3.15 Read error text

3.15.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'F' 'CHK' 'ETX'
 'F' ASCII code 0x46 OR 0x80 = **0xC6**

Example: ADR = 1
 String = 0x02 0x81 0xC6 0xC7 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'F' n..n 'CHK' 'ETX' (read value)
 'F' ASCII code 0x46 OR 0x80 = **0xC6**
 n..n: text for the error memorized in the control unit.
 Length always 32 ASCII characters.
 If there is no error, TEXT is sent back with 32x" (blank).

The total length of the data record always is 37 characters.

The formation of the check sum occurs in the same way than for the other data records.

3.15.2 Ethernet Interface

Command to chamber (PC to CPU):

F

Example: F (1 character)

Reply of chamber (CPU to PC):

Fn..n
 n..n: Errortext 32 characters, if there is no error and no warning
 present blanks are returned.

Example: Temperature range Min 08-B1 (27 characters)

Notice: If there are several errors, the first error is delivered.

3.16 Read currently errors

3.16.1 Read the number of all currently errors - Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'H01' 'CHK' 'ETX'

'H' ASCII code 0x48 OR 0x80 = **0xC8**

01: Command parameter - two-digit in ASCII OR 0x80

Example: ADR = 1

String = 0x02 0x81 0xC8 0xB0 0xB1 0xC8 0x03 (7 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'H01' _Errornumber 'CHK' 'ETX' (read value)

'H' ASCII code 0x48 OR 0x80 = **0xC8**

01: Command parameter - two-digit in ASCII OR 0x80

_: blank = 0x20 OR 0x80 = 0xA0

Errornumber: Number of all currently errors including warnings - two-digit
all bytes in ASCII OR 0x80

Example:

String = 0x02 0x81 0xC8 0xB0 0xB1 0xA0 0xB0 0xB0 0xE8 0x03 (10 bytes)

ADR = 1

H01

There are 00 errors

3.16.2 Read all currently errors - Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'H02' 'CHK' 'ETX'

'H' ASCII code 0x48 OR 0x80 = **0xC8**

02: Command parameter - two-digit in ASCII OR 0x80

Example: ADR = 1

String = 0x02 0x81 0xC8 0xB0 0xB2 0xCB 0x03 (7 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'H02' _Errornumber;Errortext1;... Errortextn; 'CHK' 'ETX'

(read value)

'H' ASCII code 0x48 OR 0x80 = **0xC8**

02: Command parameter - two-digit in ASCII OR 0x80

_: blank = 0x20 OR 0x80 = 0xA0

Errornumber: Number of all currently errors including warnings - two-digit
all bytes in ASCII OR 0x80

“,,” Separator = 0x3B OR 0x80 = 0xBB

Errortext1: Error texts - each 32 bytes in ASCII OR 0x80,
“,,” separated by separators (= 0x3B =R 0x80 = 0xBB)

Errortextn:
“,,” final separator

Example:

String = 0x02 0x81 0xC8 0xB0 0xB2 0xA0 0xB0 0xB3 0xBB 0xD4 0xE8 0xE5 0xF2
0xED 0xAE 0xA0 0xF0 0xF2 0xEF 0xF4 0xE5 0xE3 0xF4 0xA0 0xE6 0xE1
0xEE 0xA0 0xE3 0xEF 0xEE 0xE4 0xAE 0xA0 0xB0 0xB3 0xAD 0xC6 0xB5
0xAE 0xB1 0xBB 0xD4 0xE5 0xED 0xF0 0xAE 0xA0 0xCC 0xE9 0xED 0xE9
0xF4 0xE5 0xF2 0xA0 0xF4 0xE5 0xF3 0xF4 0xA0 0xF3 0xF0 0xE1 0xE3
0xE5 0xA0 0xB0 0xB1 0xAD 0xC6 0xB1 0xAE 0xB1 0xBB 0xD0 0xF4 0xB1
0xB0 0xB0 0xA0 0xF3 0xF5 0xE3 0xF4 0xAE 0xE7 0xE1 0xF3 0xA0 0xC3
0xA0 0xB0 0xB3 0xAD 0xC2 0xB1 0xB3 0xA0 0xA0 0xA0 0xA0 0xA0 0xA0
0xA0 0xA0 0xA0 0xBB 0x8B 0x03 (110 bytes)

ADR = 1

H02

There are 03 errors

1. Error: "Therm. protect fan cond. 03-F5.1"

2. Error: "Temp. Limiter test space 01-F1.1"

3. Error: "Pt100 suct.gas C 03-B13"

3.16.3 Read the number and entry of all currently errors - Ethernet Interface

Command to chamber (PC to CPU):

Hxx

xx: Command parameter - two-digit

Example: H01 (3 characters)

Following command parameters are implements:

xx = 01: Read number of errors

Reply of chamber (CPU to PC):

H01_xx (6 characters)

_: blank

xx: Number of all currently errors including warnings

Example: H01 02 (6 characters)

xx = 02: Read number of all currently errors including warnings and the relevant texts

Reply of chamber (CPU to PC):

H02_xx;Message1;Message2;MessageN;

(Length dependent on error count)

_: blank

xx: Number of all currently errors including warnings

; separator

Message1.. MessageN:

error texts in defined length (per 32 characters)

Example: H02 02;Temperature Lim. Min 08-B1 ;Temp. Limiter test space 01-F1.1; (73 characters)

3.17 Read the lock state of the keyboard

3.17.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'L' 'CHK' 'ETX'
 'L' ASCII code 0x4C OR 0x80 = **0xCC**

Example: ADR = 1
 String = 0x02 0x81 0xCC 0xCD 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'L' x 'CHK' 'ETX' (read value)
 'L' ASCII code 0x4C OR 0x80 = **0xCC**
 x:
 '0': keyboard unlocked
 '1': keyboard locked level 1
 '2': keyboard locked level 2

Example: unlock keyboard
 String = 0x02 0x81 0xCC 0xB0 0xFD 0x03 (6 bytes)

3.17.2 Ethernet Interface

Command to chamber (PC to CPU):

L

Example: L (1 character)

Reply of chamber (CPU to PC):

Lx
 x:
 '0': keyboard unlocked
 '1': keyboard locked level 1
 '2': keyboard locked level 2

Example: L1 (2 characters)

3.18 Lock/unlock the keyboard

3.18.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'I' x 'CHK' 'ETX'

'I'	ASCII code 0x6C OR 0x80 = 0xEC
x:	'0': keyboard unlocked
	'1': keyboard locked level 1
	'2': keyboard locked level 2

Example: ADR = 1; Lock keyboard level 2
String = 0x02 0x81 0xEC 0xB2 0xDF 0x03 (6 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'I' x 'CHK' 'ETX'

'I'	ASCII code 0x6C OR 0x80 = 0xEC
x:	'0': keyboard unlocked
	'1': keyboard locked level 1
	'2': keyboard locked level 2

3.18.2 Ethernet Interface

Command to chamber (PC to CPU):

Ix

x:	'0': keyboard unlocked
	'1': keyboard locked level 1
	'2': keyboard locked level 2

Example: I2 (2 characters)

Reply of chamber (CPU to PC):

Ix

x:	'0': keyboard unlocked
	'1': keyboard locked level 1
	'2': keyboard locked level 2

Example: I2 (2 characters)

3.19 Read software version statuses

Command available from ITC version 3.19 (delivery date: 14.08.2019)

3.19.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'C' 'CHK' 'ETX'
 'C' ASCII code 0x43 OR 0x80 = **0xC3**

Example: C
 String = 0x02 0x81 0xC3 0xC2 0x03 (5 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'C' PLCVersion;ITCVersion;PLCNumber; 'CHK' 'ETX'
 'C' ASCII code 0x43 OR 0x80 = **0xC3**
 ';' Separator
PLCVersion: PLC version
ITCVersion: Software on the controller
PLCNumber: Number of the CoDeSys program

Example: C01;3.19;C70350TEST;
 String = 0x02 0x81 0xC3 0xB0 0xB1 0xBB 0xB3 0xAE 0xB1 0xB9 0xBB 0xC3
 0xB7 0xB0 0xB3 0xB5 0xB0 0xD4 0xC5 0xD3 0xD4 0xBB 0x89 0x03

3.19.2 Ethernet Interface

Command to chamber (PC to CPU):

C

Reply of chamber (CPU to PC):

CPLCVersion;ITCVersion;PLCNumber
 ';' Separator
PLCVersion: PLC version
ITCVersion: Software on the controller
PLCNumber: Number of the CoDeSys program

Example: C01;3.19;C70350TEST;

3.20 Read manual limits

Command available from ITC version 3.23 (delivery date: 16.10.2020)

3.20.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'G' x 'CHK' 'ETX'

'G': ASCII code 0x47 OR 0x80 = **0xC7**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.5.3 - Chamber configuration)

Example: ADR = 1, channelno = 0 (temperature channel)
 String = 0x02 0x81 0xC7 0xB0 0xF6 0x03 (6 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'G' x_yyy.y_zzz.z 'CHK' 'ETX' (read value)

'G': ASCII code 0x47 OR 0x80 = **0xC7**
 x: channelno - one byte in ASCII OR 0x80
 (cf. chapter 3.5.3 - Chamber configuration)
 _: blank = 0x20 OR 0x80 = 0xA0
 yyy.y: Limit min of the selected analog channel with fixed format
 three digits before one after the decimal point
 (XXX.X - with negative values -XX.X)
 per byte in ASCII OR 0x80
 zzz.z: Limit max of the selected analog channel with fixed format
 three digits before one after the decimal point
 (XXX.X - with negative values -XX.X)
 per byte in ASCII OR 0x80

Example: ADR = 1, channelno = 0 (temperature channel),
 limit min = -80,0 °C, limit max = 190,0 °C
 String = 0x02 0x81 0xC7 0xB0 0xA0 0xAD 0xB8 0xB0 0xAE 0xB0 0xA0
 0xB1 0xB9 0xB0 0xAE 0xB0 0xEB 0x03 (18 bytes)

Notice: If several channels are available, each one must be read separately.

3.20.2 Ethernet Interface

Command to chamber (PC to CPU):

Gx

x: Channel number - Mapping of channel numbers could be seen in
 chapter 3.5.3 - Chamber configuration.

Example: G0 (Read limits of the chamber temperature, 2 characters)

Reply of chamber (CPU to PC):

Gx_yyy.y_zzz.z

x: Channel number see above (cf. chapter 3.5.3 - Chamber configuration)
 _: blank
 yyy.y: Limit min of the selected analog channel with one decimal place
 zzz.z: Limit max of the selected analog channel with one decimal place

Example: G0 -80.0 190.0
 (limit min = -80,0 °C, limit max = 190,0 °C, 14 characters)

Notice:

If chamber replies only with one number, this is the channel No., but the asked channel is not present. (invalid Channel No., because Channel No. CID of controller configuration is not > 0, or the channel properties CID do not contain any limit values).

3.21 Set manual limits

Command available from ITC version 3.23 (delivery date: 16.10.2020)

3.21.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'g' x_yyy.y_zzz.z 'CHK' 'ETX'

'g'	ASCII code 0x67 OR 0x80 = 0xE7
x:	channelno - one byte in ASCII OR 0x80 (cf. chapter 3.5.3 - Chamber configuration)
_:	blank = 0x20 OR 0x80 = 0xA0
yyy.y:	Limit min of the selected analog channel with fixed format three digits before one after the decimal point (XXX.X - with negative values -XX.X) per byte in ASCII OR 0x80
zzz.z:	Limit max of the selected analog channel with fixed format three digits before one after the decimal point (XXX.X - with negative values -XX.X) per byte in ASCII OR 0x80

Example: ADR = 1, channelno = 0 (temperature channel)
limit min = -70,0 °C, limit max = 180,0 °C

String = 0x02 0x81 0xE7 0xB0 0xA0 0xAD 0xB7 0xB0 0xAE 0xB0 0xA0 0xB1
0xB8 0xB0 0xAE 0xB0 0xC5 0x03 (18 bytes)

Notice: If several channels are available, each one must be set separately.

Reply of chamber (CPU to PC):

'STX' 'ADR' 'g' 'CHK' 'ETX'

'g'	ASCII code 0x67 OR 0x80 = 0xE7
-----	---------------------------------------

3.21.2 Ethernet Interface

Command to chamber (PC to CPU):

gx_yyy.y_zzz.z

x:	Channel number - Mapping of channel numbers could be seen in chapter 3.5.3 - Chamber configuration.
_:	blank
yyy.y:	Limit min of the selected analog channel with fixed format three digits before one after the decimal point
zzz.z:	Limit max of the selected analog channel with fixed format three digits before one after the decimal point

Example: g0 -70.0 180.0
(limit min = -70,0 °C, limit max = 180,0 °C, 14 characters)

Reply of chamber (CPU to PC):

g

Example: g (1 character)

Notice:

- If chamber replies only with one number, this is the channel No., but the asked channel is not present. (invalid Channel No., because Channel No. CID of controller configuration is not > 0, or the channel properties CID do not contain any limit values)
- The limits form command are limited to channel range

3.22 Read time meter and counter values

Command available from ITC version 3.31 (delivery date: 31.01.2025) and
MoReTi version 4.30 (delivery date: 07.07.2026)

3.22.1 Time meter

3.22.1.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'K' 'b' 'xx' 'CHK' 'ETX'

'K': ASCII code 0x4B OR 0x80 = **0xCB**

'b': ASCII code 0x62 OR 0x80 = **0xE2**

xx: channelno of the operating hours display - two bytes each in ASCII OR 0x80

Example: ADR = 1, channelno = 00 (general operating hours of the device)
String = 0x02 0x81 0xCB 0xE2 0xB0 0xB0 0xA8 0x03 (8 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'K' 'b' 'xx' 'yyyyyyyy.yy;zzzzzzzz.zz;qqqqqqqq.qq' 'CHK' 'ETX'

(read value)

'K': ASCII code 0x4B OR 0x80 = **0xCB**

'b': ASCII code 0x62 OR 0x80 = **0xE2**

xx: channelno of the operating hours display - two bytes each in ASCII OR 0x80

_: blank = 0x20 OR 0x80 = 0xA0

yyyyyyyy.yy: Actual value of the selected operating hours channel with a fixed format
eight digits before and two after the decimal point
one byte per digit in ASCII OR 0x80.

zzzzzzzz.zz: Limit1 of the selected operating hours channel with a fixed format
eight digits before and two after the decimal point
one byte per digit in ASCII OR 0x80.

qqqqqqqq.qq: Limit2 of the selected operating hours channel with a fixed format
eight digits before and two after the decimal point
one byte per digit in ASCII OR 0x80.

“.”: Separator = 0x3B OR 0x80 = 0xBB

Example: ADR = 1, channelno = 00 (general operating hours of the device),
Kb00 00000358.25;00001000.00;00002000.00

String = 0x02 0x81 0xCB 0xE2 0xB0 0xB0 0xA0 0xB0 0xB0 0xB0 0xB0 0xB0
0xB3 0xB5 0xB8 0xAE 0xB2 0xB5 0xBB 0xB0 0xB0 0xB0 0xB0 0xB1
0xB0 0xB0 0xB0 0xAE 0xB0 0xB0 0xBB 0xB0 0xB0 0xB0 0xB0 0xB2
0xB0 0xB0 0xB0 0xAE 0xB0 0xB0 0xAC 0x03

Notice: If several channels are available, each one must be set separately.

3.22.1.2 Ethernet Interface

Command to chamber (PC to CPU):

Kbxx

xx: channelno of the operating hours display

Example: Kb00 (general operating hours of the device, 4 bytes)

String = 0x4B 0x62 0x30 0x30 (4 bytes)

Reply of chamber (CPU to PC):

Kbxx_yyyyyyyy.yy;zzzzzzzz.zz;qqqqqqqq.qq

xx: channelno of the operating hours display

_: blank

yyyyyyyy.yy: Actual value of the selected operating hours channel with a fixed format eight digits before and two after the decimal point

zzzzzzzz.zz: Limit1 of the selected operating hours channel with a fixed format eight digits before and two after the decimal point

qqqqqqqq.qq: Limit2 of the selected operating hours channel with a fixed format eight digits before and two after the decimal point

‘,’: Separator = 0x3B

Example: Kb00 12345678.12;12345678.12;00000000.00

String = 0x4B 0x62 0x30 0x30 0x20 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x2E 0x31 0x32 0x3B 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x2E 0x31 0x32 0x3B 0x30 0x30 0x30 0x30 0x30 0x30 0x30 0x30 0x2E 0x30 0x30 (40 bytes)

3.22.2 Counter

3.22.2.1 Serial Interface

Command to chamber (PC to CPU):

'STX' 'ADR' 'K' 'z' 'xx' 'CHK' 'ETX'

'K': ASCII code 0x4B OR 0x80 = **0xCB**
 'z': ASCII code 0x7A OR 0x80 = **0xFA**
 xx: channelno of the counter display - two bytes each in ASCII OR 0x80

Example: ADR = 1, channelno = 00 (e.g. **magnetic valve cooling**)
 String = 0x02 0x81 0xCB 0xFA 0xB0 0xB0 0xB0 0xB0 0x03 (8 bytes)

Reply of chamber (CPU to PC):

'STX' 'ADR' 'K' 'z' 'xx' 'yyyyyyyy;zzzzzzzz;qqqqqqqq' 'CHK' 'ETX' (read value)

'K': ASCII code 0x4B OR 0x80 = **0xCB**
 'z': ASCII code 0x62 OR 0x80 = **0xE2**
 xx: channelno of the counter display - two bytes each in ASCII OR 0x80
 _.: blank = 0x20 OR 0x80 = 0xA0
 yyyyyyyy: Actual value of the selected counter channel with a fixed format eight digits each in ASCII OR 0x80.
 zzzzzzzz: Limit1 of the selected counter channel with a fixed format eight digits each in ASCII OR 0x80.
 qqqqqqqq: Limit2 of the selected counter channel with a fixed format eight digits each in ASCII OR 0x80.
 ',.': Separator = 0x3B OR 0x80 = 0xBB

Example: ADR = 1, channelno = 00 (e.g. **magnetic valve cooling**)
 Kz00 00002569;00010000;00012000
 String = 0x02 0x81 0xCB 0xFA 0xB0 0xB0 0xA0 0xB0 0xB0 0xB0 0xB0 0xB2
 0xB5 0xB6 0xB9 0xBB 0xB0 0xB0 0xB0 0xB1 0xB0 0xB0 0xB0 0xB0
 0xBB 0xB0 0xB0 0xB0 0xB1 0xB2 0xB0 0xB0 0xB0 0xB0 0x9A 0x03 (35 bytes)

Notice: If several channels are available, each one must be set separately.

3.22.2.2 Ethernet Interface

Command to chamber (PC to CPU):

Kzxx

xx: channelno of the counter display

Example: Kz00 (Reading the counter „magnetic valve **cooling**“, 4 bytes)
 String = 0x4B 0x7A 0x30 0x30 (4 bytes)

Reply of chamber (CPU to PC):

Kzxx_yyyyyyyy;zzzzzzzz;qqqqqqqq

xx: channelno of the counter display
 _.: blank
 yyyyyyyy: Actual value of the selected counter channel with a fixed format eight digits
 zzzzzzzz: Limit1 of the selected counter channel with a fixed format eight digits
 qqqqqqqq: Limit2 of the selected counter channel with a fixed format eight digits
 ',.': Separator = 0x3B

Example: Kz00 12345678;12345678;00000000
 String = 0x4B 0x7A 0x30 0x30 0x20 0x30 0x30 0x30 0x30 0x30 0x30 0x30
 0x3B 0x30 0x30 0x30 0x30 0x32 0x30 0x30 0x30 0x3B 0x30 0x30 0x30
 0x30 0x30 0x30 0x30 0x30 (31 bytes)