

PROGRAM DESCRIPTION

TAD 3

Program: T127A240

This description is valid for:

Weight indicator **TAD 3** with application program **T127A240**

See also the following descriptions

Weight indicator TAD 3, Technical Manual (www.vishaypg.com/doc?35184)

Weight indicator TAD 3, Operating instructions, Quick installation

If these descriptions in any case are contradictory, this description is valid.

Option codes

None

Function

This special program of the TAD 3 software allows limited emulation of the E-1 and E-2 TAD serial communication functions. The E-1 TAD and the E-2 TAD have identical protocols and where references are made to E-1 TAD in this document they can also refer to E-2 TAD and visa versa.

The E-2-TAD has one serial communication channel. Two different serial communication boards can be used:

-DCI is a current loop serial communication board. The input and output circuits are electrically separated. DCI was installed as standard.

-DVI (option board) is a serial communication board with electrical properties in accordance with the following standards: RS-232C, RS-422A and RS-423A (-A and -C are revisions). The input and output circuits are electrically isolated. There were no control signals as per standard RS-232C.

The Tad 3 has two serial ports; COM 1 may be RS232 or RS485 and COM 2 is a RS 485 port. E-2 TAD emulation is only available on COM1

Therefore only the DVI RS 232 mode can be emulated in hardware on the TAD 3.

DVI for E-2-TAD could be used at transmission speeds up to 4800 baud.

The TAD 3 serial ports allow transmissions up to 115200 baud.

Connection to the E-2 TAD and TAD 3 differ. See the relevant Technical Manuals for details

General

In order to communicate with an external computer using the E-2 TAD emulation function the set-up parameter COM 1 MODE' must be set to 'special' and in set-up parameter 'Special menu', select one of four different 'ADDRESS MODE'.

For other settings (baud rate etc) see Chapter 3 of the TAD 3 Technical Manual. Communication between TAD and an external computer takes place in such a way that the computer sends a 'Command message' to the TAD and the TAD returns a 'Reply message'.

If a new command message is sent to TAD before it has replied to the previous message then the new command will be ignored.

NOTE. Wait always for a reply message from previous command, before sending any new command message.

All messages are in ASCII code. A message is commenced with a start character (<STX> 02 hex) and concluded with an end character (<CR> 0D hex). This applies to all messages. The message length is not fixed but varies for different command and reply messages.

Set-up parameters

New parameters

Menu 'Special menu'

Address mode	Modbus: 41338 (46338)	
Range: 0 – 3 <0>	0 = No address: 1 = Address:	No address is used All messages sent would be labelled with the instrument address. All messages to the instrument must be labelled with the address.
	2 = Daisy chain:	The instrument will retransmit all received messages not addressed to this instrument. All messages sent will be labelled with the instrument address.
	3 = Address multi drop:	Works like Address, but if any faulty checksum is detected the instrument will NOT respond with nak1 'error in received message. (No answer at all will be sent)

Menu 'Special menu'

Checksum

Modbus: 41340 (46340)

Range:

0 – 1

<0>

Type of checksum

0 = Standard checksum

1 = Alternative checksum

Modified parameter

Menu 'Communication'

COM1: Mode

Modbus: 41116 (46116)

[6] Special
<Modbus auto>

New choice for COM1: Mode.

Special: *Emulation of E1/E2 -TAD ASCII protocol.*

Different Types of Message

Two types of message are used in communication between TAD and an external computer. These two types are 'Command messages' and 'Reply messages'.

Command message: Used by the unit that activates an exchange of messages between TAD and the external computer

Reply message: Reply to a command message.
The TAD sends this type of message as a reply to the external computer

Definition of Command Message

Command message:

STX|address|XX|command data|chksum|CR

STX	Start character, ASCII STX (= 02 hex)
address	Optional instrument address. '01' - '99' ASCII
XX	Command (2 character). 'XX' ASCII See definition for each command.
command data	Data content of the command message. See definition for each command. Most commands do not have this data.
chksum	Checksum (1 character)
CR	End character, ASCII CR (0D hex)

Definition of Reply Message

Reply message:

STX|address|ack-type|XX|reply data|chksum|CR

STX	Start character, ASCII STX (= 02 hex)
address	Optional instrument address. '01' - '99' ASCII
ack-type	There are 4 types of acknowledgement: ack command performed '0' ASCII nak1 error in received message '1' ASCII nak2 cannot perform command '2' ASCII
XX	Command (2 character). 'XX' ASCII Same command character as in the Command message that activated this reply. If ack-type = nak1 then these characters are excluded.
reply data	Data. See definition for each command. Some replies have no reply data. If ack-type = nak1 or nak2 then these data are excluded.
chksum	Checksum (1 character)
CR	End character, ASCII CR (= 0D hex).

Address mode

An instrument address must be used when two or more Tad's are connected in series (daisy chain), parallel (multi drop) or when it is desirable to give the messages from each instrument an identification.

If the COM1: Mode is '0'(No address is used) this data (2 digits) shall be excluded in all messages.

If the 'COM1: Mode' is '1' (address) each command and reply message to the instrument must contain an address. All messages containing a 'wrong' address are ignored by the instrument (no replies obtained).

Messages containing the 'right' address are processed by the instrument. All messages from the instrument are provided with an address.

If the 'COM1: Mode' is '2' (daisy chain), each command and reply message to the instrument must contain an address. All messages containing a 'wrong' address are retransmitted by the instrument. Messages containing the 'correct' address are processed by the instrument and not transmitted on.

All messages from the instrument are provided with an address.

If the 'COM1: Mode' is '3' (address multi drop), it works like Address, but if any faulty checksum is detected by the instrument it will not respond with nak1 in reply message (No replay message at all will be sent).

If either 'COM1: Mode' is used ('daisy chain', 'address multidrop' or 'address') each instrument shall be given an address. The address is set in 'instrum address'. It is possible to set up to 99 different addresses (01-99). When several instruments are connected in series (daisy chain) or parallel ('address multidrop' or 'address') each instrument must be given a unique address.

Acknowledgement

There are 3 different types of acknowledgements. Note that the acknowledgement is not a control character but a digit, '0' - '2' (ASCII)

ack	command performed	'0' ASCII
nak1	error in received message	'1' ASCII
nak2	cannot perform command	'2' ASCII

The 'nak1' acknowledgement is obtained when the Command message is erroneous (e.g. non-existing command characters, parity error, faulty checksum). In the case of 'nak1', the 'command character' and 'data' are excluded in the reply message.

Acknowledgement 'nak2' are obtained when the instrument is unable to carry out the command for one reason or another (e.g. software option lacking, incorrect data, instrument in an error condition). A more detailed explanation of the conditions for these two acknowledgements is given for each command.

In 'nak2', 'data' is excluded in the reply message.

Checksum

The instrument can handle two different types of checksum (standard or alternative checksum). All messages to the instrument must be provided with a correct checksum and the instrument supplies all messages with a checksum.

The type of checksum to be used is selected with the set-up parameter Menu 'Special menu' Checksum, 'Type of checksum'.

Standard checksum Menu 'Special menu' Checksum = 0

The checksum (1 byte) is the binary modulo 64 sum (six bits used) of all characters preceding the checksum (**excluding the start character**) in a message. The seventh bit must always be set to '1' and the eighth bit must be used as a parity bit. ASCII code (hex) is always used in calculating the checksum.

Example:

Command: 'WV' with address '01' (STX, 01, WV, Checksum, CR)

Checksum: $((30 + 31 + 57 + 56) \text{ AND } 3F) \text{ OR } 40 = 4E$ (hex)

(ASCII: '0' '1' 'W' 'V' 'N')

NOTE that the checksum 7F (hex) can occur. This is the control character that must be observed when programming the computer.

Alternative checksum Menu 'Special menu' Checksum = 1

The checksum (1 byte) is the binary module 64 sum (six bits used) of all characters preceding the checksum (**excluding the start character**) in a message. The seventh bit must always be set at '1'. After this, the number 16 (10 hex) is subtracted. The eighth bit is used as parity bit. ASCII code (hex) is always used in calculating the checksum.

The alternative checksum, then, is very similar to the standard checksum but can only assume values between 30 - 6F (hex). This means that the checksum will only be writeable characters (can never be a control character).

Example:

Command: 'WV' with address '01' (STX, 01, WV, Checksum, CR)

Checksum: $((30 + 31 + 57 + 56) \text{ AND } 3F) \text{ OR } 40) - 10 = 3E$ (hex)

(ASCII: '0' '1' 'W' 'V' '>')

Commands from an External Computer (Command Messages)

A command message from an external computer consists of a command (two command characters) and data if any.

NOTE. Commands marked as options require the corresponding software option.

Command	Explanation	Page	Option
WV (Weight Value)	Send weight immediately	25	
GV (Gross Value)	Send gross weight immediately	17	
NV (Net Value)	Send net weight immediately	20	
AT (AutoTare)	Send autotare value	9	
TR (Tare Request)	Tare	23	
ZR (Zero Request)	Zero setting	28	
GM (Gross Mode)	Set instrument to gross mode	16	
NM (Net Mode)	Set instrument to net mode	19	
CM (Change Man.)	Change manual tare value	11	
MT (Manual Tare)	Send manual tare value	18	
CS (Change Setp.)	Change setpoint	12	
SS (Send Setp.)	Send setpoint	22	
RM (Remote)	Remote control on/off	21	
AW (Acc. Weight)	Send accumulated weight	10	BATCH
ZA (Zero Acc.)	Zero accumulated weight	27	BATCH
FR (Flow Rate)	Send flow rate	15	FLOW RATE
WD (Weight Disp.)	Switch to weight display	24	FLOW RATE
FD (Flowr. Disp.)	Switch to flow rate display	14	FLOW RATE
BD (Set Batch Data)	Change batching data	29	BATCH
BS (Batch Status)	Send batching status	30	BATCH
EB (Exit Batch)	Reset (exit) batching	33	BATCH
GD (Get Batch Data)	Send batching data	34	BATCH
HB (Halt Batch)	Halt batching	35	BATCH
RA (Reset Alarm)	Reset batching alarm	36	BATCH
RB (Restart Batch)	Restart batching	37	BATCH
SB (Start Batch)	Start batching	38	BATCH

AT Send autotare value

(Auto Tare)

AT

STX|address|AT|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
AT	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

AT Reply from TAD

STX|address|ack-type|AT|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) = command performed. Or: nak1 (1) = error in received message, or nak2 (2) = cannot perform command.
AT	Command ID (2 characters).
value	Autotare value. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE 1: Autotare value:
ASCII string of variable length. First character is blank (positive value) or '-' (minus sign, negative value). This is followed by 1 - 6 digits ('0' - '9') and decimal point if any. All in all, the autotare value can contain 2 - 8 characters.

AW Send accumulated weight

**(Acc. Weight)
(optionBatch)**

AW

STX|address|AW|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
AW	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

AW Reply from TAD

STX|address|ack-type|AW|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) = command performed. Or: nak1 (1) = error in received message, or nak2 (2) = cannot perform command.
AW	Command ID (2 characters).
value	Accumulated weight. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
 - Option 'Batching' not included in software.

NOTE 1: Accumulated weight:
ASCII string of variable length. First character is blank (positive value).
This is followed by 1 - 9 digits ('0' - '9') and decimal point if any.
All in all, the value of accumulated weight can contain 2 - 11 characters.

CM Change manual tare value

(Change Man.)

CM

STX|address|CM|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
CM	Command ID (2 characters).
value	Manual tare value. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

CM Reply from TAD

STX|address|ack-type|CM|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed, or nak1 (1) error in received message, or nak2 (2) cannot perform command.
CM	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
 - Illegal value of manual tare value
(negative value, non-numerical value or too large value).

NOTE 1: Manual tare value:
ASCII string of variable length. First character is blank (positive value, can be omitted). This is followed by 1 - 6 digits ('0' - '9') and decimal point if any. All in all, the manual tare value can contain 1 - 8 characters.

CS Change setpoint

(Change Setp.)

CS

Change setpoint value.

STX|address|CS|SP-no|SP-data|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
CS	Command ID (2 characters).
SP-no	Setpoint number (1 character, 1, 2, 3, 4, 5, 6, 7, or 8)
SP-data	Setpoint data. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

CS Reply from TAD

STX|address|ack-type|CS|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed, or nak1 (1) error in received message, or nak2 (2) cannot perform command.
CS	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Illegal value of setpoint:
 - Setpoint number not 1, 2, 3, 4, 5, 6, 7, or 8.
 - Illegal value of setpoint (non-numerical value or too large value).

NOTE 1: Setpoint data.

Setpoint data consist of Setpoint value.

SP-data = SP-value

SP-value Setpoint value. NOTE 2!

NOTE 2: Setpoint value:
ASCII string of variable length. First character is blank
(positive value, can be omitted).
This is followed by 1 - 6 digits ('0' - '9') and decimal point if any.
All in all, the setpoint value can contain 1 - 8 characters.

NOTE!: **E-1/E-2-TAD Setpoint activation function: Not implemented.**

FD Switch to flow display

**(Flow Display)
(option FLOW RATE)**

Set the instrument to flow rate display mode.

STX|address|FD|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
FD	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

FD Reply from TAD

STX|address|ack-type|FD|Weight status|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
FD	Command ID (2 characters).
Weight status	Weight status. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Option 'Flow Rate' not included in program.

NOTE 1: Weight status:
See definition of weight status in 'WV' command.

FR Send flow rate**(Flow Rate)
(option FLOW RATE)**

Sends the flow rate value (even if the instrument displays weight).

STX|address|FR|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
FR	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

FR Reply from TAD

STX|address|ack-type|FR|FR-msg.|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
FR	Command ID (2 characters).
FR-msg.	Flow rate message. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Option 'Flow rate' not included in program.

NOTE 1: Flow rate message.**FR-msg. = Weight status + Flow rate value**

Weight status (2 characters). NOTE 2!

Flow rate value NOTE 3!

NOTE 2: Weight status: see definition of weight status in 'WV' command.

NOTE 3: Flow rate value: ASCII string of variable length.
First character blank (positive value) or '-' (minus sign, negative value).
This is followed by 1 - 6 digits ('0' - '9') and decimal point if any.
All in all, the flow rate value can contain 2 - 8 characters.

GM Set instrument to gross mode

(Gross Mode)

GM

STX|address|GM|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
GM	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

GM Reply from TAD

STX|address|ack-type|GM|W-msg|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
GM	Command ID (2 characters).
W-msg	Gross weight. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE 1: Gross weight.
See definition of weight message in 'WV' command.

GV Send gross weight immediately (Gross Value)

GV

Sends gross weight (even if the instrument is in net mode)

STX|address|GV|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
GV	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

GV Reply from TAD

STX|address|ack-type|GV|W-msg|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
GV	Command ID (2 characters).
W-msg	Gross weight. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE 1: Gross weight:
See definition of weight message in 'WV' command.

MT Send manual tare value

(Manual Tare)

MT

STX|address|MT|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
MT	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

MT Reply from TAD

STX|address|ack-type|MT|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
MT	Command ID (2 characters).
value	Manual tare value. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE 1: Manual tare value:
ASCII string of variable length. First character is blank
(positive value). This is followed by 1 - 6 digits ('0' - '9')
and a decimal point if any.
All in all, the manual tare value can contain 2 - 8 characters.

NM Set instrument to net mode

(Net Mode)

NM

STX|address|NM|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
NM	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

NM Reply from TAD

STX|address|ack-type|NM|W-msg.|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
NM	Command ID (2 characters).
W-msg.	Net weight. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
 - If the tare value in use is zero (0).

NOTE 1: Net weight:
See definition of weight message in 'WV' command.

NV Send net weight immediately**(Net Value)****NV**

Sends net weight (even if the instrument is in gross mode).

STX|address|NV|checksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
NV	Command ID (2 characters).
checksum	Checksum (1 character).
CR (0D hex)	End character.

NV Reply from TAD

STX|address|ack-type|NV|W-msg.|checksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
NV	Command ID (2 characters).
W-msg.	Net weight. NOTE 1!
checksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE 1: Net weight:
See definition of weight message in 'WV' command.

RM Remote control on/off

Enables/disables panel keys.

STX|address|RM|type|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
RM	Command ID (2 characters).
type	ON disable panel keys, OFF enable panel keys.
chksum	Checksum (1 character).
CR (0D hex)	End character.

RM Reply from TAD

STX|address|ack-type|RM|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
RM	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Remote control ON (disables the keys on the TAD3 unit) - indicated on display with text 'REMOTE OPERATION'. This command is only valid when TAD3 is displaying weight or a Batching screen (batching running, halted or ready).

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

SS Send setpoint

(Send Setp.)

SS

Sends setpoint status and setpoint value.

STX|address|SS|SP-no|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
SS	Command ID (2 characters).
SP-no	Setpoint number. '1' or '2'
chksum	Checksum (1 character).
CR (0D hex)	End character.

SS Reply from TAD

STX|address|ack-type|SS|SP-no|W-stat.|SP-data|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) message accepted. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
SS	Command ID (2 characters).
SP-no	Setpoint number. '1' or '2'
W-stat.	Weight status. NOTE 1!
SP-data	Setpoint data. NOTE 2!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - Continuous weight sending in progress.
 - Illegal setpoint number (not 1, 2, 3, 4, 5, 6, 7 or 8).

NOTE 1: Weight status:
See definition of weight status in 'WV' command.

NOTE 2: Setpoint data:
See definition of setpoint data in the 'CS' command.
Note that data for setpoint activation (SP-act) is only sent as dummy 'OF' (make reply compatible to E-1/E- 2 TAD).

TR Tare**(Tare Request)****TR**

Tares the instrument (autotare value stored, net weight = 0).

STX|address|TR|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
TR	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

TR Reply from TAD

STX|address|ack-type|TR|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
TR	Command ID (2 characters).
value	Auto tare value. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - Weight is unstable (only if 'Motion check', Calibration parameters, is On)

NOTE 1: Autotare value:
 ASCII string of variable length. First character is blank (positive value) or '-' (minus sign, negative value).
 This is followed by 1 - 6 digits ('0' - '9') and decimal point if any.
 All in all, the autotare value can contain 2 - 8 characters.

WD Switch to weight display**(Weight Display)
(opt. FLOW RATE)**

Sets the instrument to weight display mode

STX|address|WD|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
WD	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

WD Reply from TAD

STX|address|ack-type|WD|Weight status|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
WD	Command ID (2 characters).
Weight status	Weight status. (2 characters). NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Option 'Flow rate' not included in program.

NOTE 1: Weight status:
See definition of weight status in 'WV' command.

WV Send weight immediately**(Weight value) WV**

Sends displayed weight (net or gross) depending on current instrument status.

STX|address|WV|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
WV	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

WV Reply from TAD

STX|address|ack-type|WV|W-msg.|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
WV	Command ID (2 characters).
W-msg.	Weight message. NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)

NOTE1: Weight message.
W-msg. = Weight status + Weight value

Weight status (2 characters). NOTE 2!
Weight value. NOTE 3!

NOTE 2: Definition of weight status:

'1' = Function fulfilled,
current instrument status.

'0' = Function not fulfilled

Weight status 1 (first character)

Case 1: 'Normal weight'

Bit no	Function	Comments
0	During warm up	See Calibration parameters
1	Motion	See Calibration parameters
2	Weight < 'Min. weight for printing'	See Calibration parameters
3	Good zero	See Chapter 5 Operation
4	Net mode	'1' = instrument in net mode. '0' = instrument in gross mode.
5	- spare -	
6	Always '1' (at 'Normal Weight')	
7	Not used	(parity bit)

Case 2: 'Abnormal weight' (NOTE! Weight value is invalid).

Bit no	Function	Comments
0	Calibration resistor on	
1	- spare -	
2	Over-/Under-load	
3	Over-/Under-range	
4	- spare -	
5	Always '1' (at 'Abnormal Weight')	
6	Always '0' (at 'Abnormal Weight')	
7	Not used	

Weight status 2 (second character)

Bit no	Function	Comments
0	Setpoint Relay 1 activated	Internal Relay 1 on
1	Setpoint Relay 2 activated	Internal Relay 2 on
2	- spare -	
3	- spare -	
4	- spare -	
5	Flow rate display	'1' = Flow rate display '0' = Weight display
6	Always '1'	
7	Not used	

NOTE 3: Weight value:

ASCII string of variable length. First character is blank (positive value) or '-' (minus sign, negative value). This is followed by 1 - 6 digits ('0' - '9') and decimal point if any. All in all, the weight value can contain 2 - 8 characters.

ZA Zero accumulated weight

**(Zero Acc.)
(option Batch)**

ZA

STX|address|ZA|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ZA	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

ZA Reply from TAD

STX|address|ack-type|ZA|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99)
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
ZA	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - Option 'Batching' not included in software.
- Zeroing not permitted (accumulated weight has not been sent to the external computer (command 'AW') after the latest weight accumulation).

ZR Zero setting

(Zero Request)

ZR

Sets the displayed gross weight to zero (see Chapter 5).

STX|address|ZR|checksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ZR	Command ID (2 characters).
checksum	Checksum (1 character).
CR (0D hex)	End character.

ZR Reply from TAD

STX|address|ack-type|ZR|W-msg.|checksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
ZR	Command ID (2 characters).
W-msg.	Gross weight. NOTE 1!
checksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - If weight is unstable.
 - If zeroing is not permitted (instrument is in NET mode or gross weight differs more than permitted from original zero setting).

NOTE 1: Gross weight:
See definition of weight message in 'WV' command.

BD Change batching data (Set Batch Data) (option BATCH)
 Change setpoint .
 comp 1, 2, 3, 4, 5, 6 or
 Change Number of batches.

STX|address|BD|type|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
BD	Command ID (2 characters).
type	Setpoint 1, 2, 3, 4, 5, 6 or Number of batches (A)
value	Batch data NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

BD Reply from TAD

STX|address|ack-type|BD|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
BD	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - Option 'Batching' not included in software.
 - Illegal values of 'type' (not 1, 2, 3, 4, 5, 6 or A).
 - Illegal batch data value (negative value, non-numerical value or too large value).

NOTE 1: Batch data:
 ASCII string of variable length. First character is blank (positive value, can be omitted). This is followed by 1 - 6 digits ('0' - '9') and decimal point if any. All in all, the batch data value can contain 1 - 8 characters.

BS Send batching status

(Batch Status)
(option BATCH).

BS

STX|address|BS|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
BS	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

BS Reply from TAD

STX|address|ack-type|BS|B-stat|W-msg.|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, nak2 (2) cannot perform command.
BS	Command ID (2 characters).
B-stat	Batching status NOTE 2!
W-msg.	Weight message NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - Option 'Batching' not included in software.

NOTE 1: Weight message:
See definition of weight message in 'WV' command.

NOTE 2:**Batching status****B-stat = Batch-sequ. + Batch step + Alarm type + Power fail**

Batch-sequ.	Batching Not Active	(0)	
	Batching on (running)	(1)	
	Batching halted	(2)	
	Batching alarm	(3)	
	BatchingHaltedForManualOperation	(4)	
Batch step	Batching off	(00)	
	Initialising batching	(01)	
	Starting batching	(02)	
	Checking setpoints	(03)	
	Filling material	(04)	
	Checking acknowledge	(05)	
	Autotaring	(08)	
	Batching coarse	(10)	
	Batching fine	(11)	
	BatchingOnePhase	(12)	
	Delay after batching	(14)	
	Checking tolerance	(17)	
	Pulsing	(20)	
	Dumping	(23)	
	Delay after dumping	(24)	
	Finishing batching	(25)	
	Reseting batching	(26)	
	Initializing activity	(27)	
	Pulse batching coarse	(28)	
	Pulse batching fine	(29)	
	Pulse batching one phase	(30)	
	Delay after filling	(31)	
	Timing	(32)	
	Timing with output	(33)	
	Activating latch	(34)	
	Deactivating latch	(35)	
	Manual operation	(36)	
	Finishing manual operation	(37)	
	Finishing activity	(38)	
	Skipping activity	(39)	
	Alarm type	No alarm	(00)
		Setpoint alarm	(02)
		Acknowledge alarm	(03)
		Timeout alarm	(04)
		Minus tolerance alarm	(05)
		Plus tolerance alarm	(06)
		Unstable weight alarm	(07)
		Weight error alarm	(08)
		Power fail alarm	(09)
Power fail	NO	(0)	
	YES	(1)	

NOTE 3!

GD Send batching data

**(Get Batch Data)
(option BATCH)**

Send setpoint .
comp 1, 2, 3, 4, 5, 6 or
Send Number of batches.

STX|address|GD|type|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
GD	Command ID (2 characters).
type	Setpoint 1, 2, 3, 4, 5, 6 or Number of batches (A)
chksum	Checksum (1 character).
CR (0D hex)	End character.

GD Reply from TAD

STX|address|ack-type|GD|value|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, nak2 (2) cannot perform command.
GD	Command ID (2 characters).
value	Batch data NOTE 1!
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Option 'Batching' not included in software.
- Illegal values of 'type' (not 1, 2, 3, 4, 5, 6 or A).

NOTE 1: Batch data:

ASCII string of variable length. First character is blank (positive value) or '-' (minus). This is followed by 1 - 6 digits ('0' - '9') and decimal point if any. The string can contain 2 - 8 characters.

HB Halt batching**(Halt Batch)
(option BATCH)****HB**

STX|address|HB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
HB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

HB Reply from TAD

STX|address|ack-type|HB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
HB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2: - The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
- Option 'Batching' not included in software.

RB Restart batching

(Restart Batch)
(option BATCH)

RB

STX|address|RB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
RB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

RB Reply from TAD

STX|address|ack-type|RB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, or nak2 (2) cannot perform command.
RB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state' (Initiation after power-up, during set-up or error condition.)
 - Option 'Batching' not included in software.
 - Batching not started.
 - Alarm has not been reset.

SB Start batching**(Start Batch)
(option BATCH)****SB**

STX|address|SB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
SB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

SB Reply from TAD

STX|address|ack-type|SB|chksum|CR

Message part	Explanation
STX (02 hex)	Start character.
address	Optional instrument address (2 characters, 01 - 99).
ack-type	ack (0) command performed. Or: nak1 (1) error in received message, nak2 (2) cannot perform command.
SB	Command ID (2 characters).
chksum	Checksum (1 character).
CR (0D hex)	End character.

Acknowledgement conditions:

- nak2:
- The instrument is not in 'normal state'
(Initiation after power-up, during set-up or error condition.)
 - Option 'Batching' not included in software.
 - Batching halted or alarm not been reset.

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