TRANSTRONIC AB

INKLINATOR CMI "BENCH"
Mounting instruction

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1 MOUNTING

Master:
Mount the master where it can be seen and operated by the driller.

Sight:
Mount the sight where it can be seen and operated by the driller (normally with the bracket on top).

Angle transducer:
Mount the transducer with the connectors pointing downwards on the feeder or the feeder holder at a location where it is well protected. It can be mounted on any side of the feeder (note: setting of the system).

Boom joint transducer:
The centre of the boom joint transducer shall be mounted directly over the boom-joint shaft. The arm on the transducer should measure the boom movement.

Swinging cab transducer (when required)
Mount the transducer where it measures the movement between the chassie of the rig and the cabin. The centre of the transducer is mounted directly over the rotation axis of the cabin.

Standard length transducer:
Mount the length transducer on the feeder on the opposite side to the drifter with the chain wheel pointing downwards in a place where it can link into the feeder chain.

Laser sensor (when used)
The laser sensor should be mounted securely on the drifter cradle in a position where it can easily be hit by the laser beam (i.e. it is not obscured by hoses etc).

GPS compass:
The antennas are mounded on the carrier where they have access to the satellites. I ex on roof on the cabin. The antennas are mounded 90 deg against the length direction on the carrier. Right antenna to the right. The electronic box is mounted on a well protected place. The power to it is taken from the main switch. The electronic box need power all the time.

GPS Level:
The electronic unit is mounted at a protected place. Power supply direct from the main switch. The antenna is mounted at the top of the feeder with the devibrated holder.

Cables:
The choice of routing of each cable should be made based on providing the best possible protection while allowing for movement of the boom, feeder and drifter cradle, where applicable. For connection see drawing *07032620D.*

The power supply for the system must be taken from an even, stable source of 24V DC, via a 1 Amp, in-line fuse.

2 FUNCTION MASTER

Upper Display

Lower Display

On/Off Switch

Σm (total) button

Reset // button

+/- knob

GPS compass/Sight

Angle/Pause/Length

On/Off Switch. Turns the system On/Off.

Σm (total) button. When pressed, the total length (drilled in rock) is shown on the lower display. On the upper display the number of holes longer than 0,8 m is shown.
To zero set press both Σm (total) button and Reset // button at the same time.
Note: Angle/Pause/Length mode switch has to be in mode Length.

Reset // button. When pressed length measured for the last hole is zeroed.
Note: Angle/Pause/Length mode switch has to be in mode Length.

Angle/Pause/Length mode. If the switch is in Angle mode: the system shows angles.
Upper display is side angle and lower display inclination angle. **Note:** All angles refer to the direction the sight is pointing. If checking angles while drilling, the system will continue to measure the length of the hole being drilled, while in Angle mode.
If the switch is in Pause mode: both displays will show '-----'. **Note:** In this mode, the system will stop measuring length. Hence, if the driller wants to stop measuring length to avoid any hole length errors, e.g. during flushing a hole with percussion and assuming percussion is being used as a drilling signal, then this mode can be used.
If the switch is in Length mode: the system shows the rate of penetration on the upper display (updated every 3 seconds) and the position of the bit from the collar (or laser line) on the lower display.

Automatic system check.
The system has an automatic monitoring which checks that the master is communicating with all transducers in a proper way.
If a cable is broken or if a transducer fails the upper display will show "**Err"** the lower display will show the node no which fails. If more than one node is failing the display will toggle between the faulty node numbers.
If the master doesn't have contact with any transducer the display will show **"OFF"**.

Remote display
A smart phone (Android) can as an option connect through WiFi to the system as a remote display.

3 Checking of the system

3.1 Application program.

Make sure that the switch Angle/Pause/Length is in position Angle. (Left).
Turn the system off.
Press the reset // button down and hold it.
Turn the system on.
Release the reset // button.
Now the upper display shows 9999
Lower display shows 0
Press Σm (total).

Upper Display	**Lower display**
9001	**1**

Lower display shows the selected application.
1 = Benching
If not contact Transtronic AB.
Press Σm (total).

3.2 Transducer nodes

Upper display shows transducer node number.
Lower display shows '1' if the transducer node is connected and '0' if not.
Press Σm (total) to select next transducer node.

Mounted transducer's node shell be 1. All others shell be 0.
To change go to setting of the system. (Chapter 4).
Check that all connected transducers is in contact with the master.

Upper Display	**Lower display**
01	Length transducer
02	Angle transducer.
03	Sight
04	Boom-joint transducer.
05	Swinging cab transducer.
12	GPS Compass
13	GPS Level
...	
16	

3.3 Checking transducer signals.

Press Σm (total) several times until the upper display shows 16.
Press Σm (total).
Now the shows the values (after calibration) of the connected transducer.
If a transducer is not connected the system shows next transducer.

Upper Display	Lower display
1011	**Length transducer** counter. When the cradle is moved downwards the value shall increase.
1012	**Laser receiver** signal. Lowest digit 1 when active, 0 when inactive.
1021	**Side angle** transducer. When the feeder is in the plumb line the value shall be approx 0^0 ($\pm 3^0$). When the bit is moved to the left the value shall be positive and when the bit is moved to the right the value shall be negative.
1022	**Inclination angle** transducer. When the feeder is in the plumb line the value shall be approx 0^0 ($\pm 3^0$). When the bit is moved is moved forwards the value shall be positive and when the bit is moved backwards the value shall be negative.
1031	**Sight.** When the sight is straight forward the value shall be approx 0^0 ($\pm 3^0$). When the sight is moved to the right the value shall be positive and when the sight is moved to the left the value shall be negative.
1041	**Boom-Joint transducer**. When the boom is straight forward the shall be approx 0^0 ($\pm 3^0$). When the boom is moved to the right the value shall be positive and when the boom is moved to the left the value shall be negative.
1051	**Swinging cab transducer**. When the cabin is straight forward the shall be approx 0^0 ($\pm 3^0$). When the cabin is moved to the right the value shall be negative and when the cabin is moved to the left the value shall be positive.
1121	**GPS Compass** Shows the direction of the carrier.
1131	**GPS Level.** Shows the rigs antenna height related to the Base station antenna.

If any values count in the wrong direction go to setting of the system. (Chapter 4).

3.4 ZERO SETTING

Adjust the feeder to the plumb line on the machine.
Adjust the boom straight forward.
Adjust the cabin and the sight straight forward.

Turn the system off. (Not necessary if you already are already in trouble shooting mode - then continue to press Σm (total) until 2021 is shown.)
Press the reset // button down and hold it.
Turn the system on.
Release the // button.
Now the Upper display shows 9999
Lower display shows 0
Press Σm (total)several times until the upper display shows 2021

For zero setting of a transducer press reset // button.
To select the next transducer press Σm (total).

Upper display		**Lower Display**
2021	Side angle transducer.	Shows the value from the transducer.
2022	Inclination transducer.	After zero setting it shows 0.0
2031	Sight.	
2041	Boom joint transducer.	
2051	Swinging cab transducer.	

3.5 OPERATOR SETTINGS

Turn the system off. (Not necessary if you already are already in trouble shooting mode then continue to press Σm (total) until 3101 is shown.)
Press the reset // button down and hold it.
Turn the system on.
Now the Upper display shows 9999
Lower display shows 0000
Press Σm (total)several times until the upper display shows 3101

Distance between laser receiver and drill bit or distance between GPS-antenna and bottom of feeder.
Which function is set in setup 5010.

Upper display	**Lower Display**
3101	Shows the value between the laser receiver and the drill bit with first rod inserted or the distance between GPS-antenna and bottom of feeder. Use the +/- knob and turn it so it shows the length between the laser receiver and the drill bit e.g. 3.45 (metre). (Leave at 0.0 if laser receiver not connected).

To save value press reset // button.
To change function press Σm (total).

Drill rod length.

Upper display	**Lower Display**
3102	Shows the maximal rod length. Use the +/- knob and turn until it shows length of on drill rod. 0.0 is disconnection.

Measurement resolution.

3103	Measurement resolution. 0.1, 0.2 and 0.5 degrees can be selected by using the +/- knob and turning it.

To save value press reset // button.
To change function press Σm (total).

3.6 TEST OF OUTPUT SIGNALS

Turn the system off. (Not necessary if you already are in trouble shooting mode then continue to press Σm (total) until 3201 is shown)
Press the reset // button down and hold it.
Turn the system on.
Now the upper display shows 9999
Lower display shows 0000
Press Σm (total) several times until the upper display shows 3201

Upper display	**Lower Display**
3201	Shows nothing. When pressing // button the output signal becomes active (lower display will show ‘1’.

3.7 TEST OF INPUTS SIGNALS.

Turn the system off. (Not necessary if you already are in trouble shooting mode then continue to press Σm (total). until 3301 is shown)
Press the reset // button down and hold it.
Turn the system on.
Now the upper display shows 9999
Lower display shows 0000
Press Σm (total) several times until the upper display shows 3301

Upper display **Lower display**

3301 Shows 0000. If an input gets active it changes to 1

Drilling signal 4	Drilling signal 3	Drilling signal 2	Drilling signal 1	Lower Display
0	0	0	1	0001
0	0	1	0	0010
0	1	0	0	0100
1	0	0	0	1000

3401 Shows 1 when the switch GPS/Sight.
GPS compass = 1
Sight = 2

3501 Test of switch Angle/Paus/LengthShows.
Angle = 1
Pause = 2
Length = 3

4 Setting of the system

Here you tell the system witch transducer that is connected:
Turn the system off.
Press the reset // button down and hold it.
Turn the system on.
Release the // reset button.
Now the Upper display shows 9999 and the lower 00.
Use the +/- knob and adjust so that you have 0099 on the lower display.
Press Σm (total).

To change a value, use the +/- knob and adjust to 0 or 1.
Press // to save the setup value.

Go to next press Σm (total).

Function	Upper Display	Lower Display
Length Transducer	**01**	
Connected		**1**
Not connected		**0**
Angle transducer	**02**	
Connected		**1**
Not connected		**0**
Sight	**03**	
Connected		**1**
Not connected		**0**
Boom joint transducer	**04**	
Connected		**1**
Not connected		**0**
Swinging Cab transducer	**05**	
Connected		**1**
Not connected		**0**
GPS Compass	**12**	
Connected		**1**
Not connected		**0**
GPS Level	**13**	**1**
		0

Function	Upper Display	Lower Display
Length transducer direction	**1011**	
Normal		**0* (‘*’ is default)**
Reversed direction		**1**
Sight direction	**1031**	
Normal		**0***
Reversed direction		**1**
Boom joint transducer direction	**1041**	
Normal		**0***
Reversed direction		**1**
Swinging Cab direction	**1051**	
Normal		**0***
Reversed direction		**1**
Angle transducer mounting	**5001**	
Seen from the rig		
Back side		**1**
Left side		**2**
Front side		**3**
Right side		**4***
Chain selection for the length transducer	**5002**	
022430 cylinder feeder 1:2		**1***
022430 cylinder feeder 1:1		**2**
1"		**3**
1 1/4"		**4**
1 1/2"		**5**
1 3/4"		**6**
2"		**7**
1"Wire		**8**
Setting of mm/pulse		**0** Press Σm.

The chain pitch/4 in mm shall be set. The setting is done in two steps. First, the upper display shows ChP1 and now mm can be set by the +/- knob. Press Σm again and now the upper display shows ChP2 and the decimal value can be set. Press // to save the value in the length transducer.

Drilling signals connection **5003**

Only one drilling signal (e.g. percussion or rod handling) **1***

Drill 1	Drill 2	
0	x	Length measurement off
1	x	Length measurement on

The normal way to Digital 1 is to mount a relay over the hour counter for the drill hammer.

Both drilling signal 1 and 2 (Normally drilling rotation and air on) **2**

Drill 1	Drill 2	
0	0	Length measurement off
1	1	Length measurement on

To get in to length measurement, both signals must be active.
To get out of length measurement mode both signals must be inactive.

Atlas Copco D series: **3**

One drilling signal connected to the length transducer user (percussion) **4**
Drilling signal 5
- 0 Length measurement off
- 1 Length measurement on

The most common connection is to the rig's hour counter for the drill hammer.

Hole length or hole depth **5004**
Hole length **0***
Hole depth **1**

Type of length measurement mode **5005**
Length of the hole **0**
(Shows the length of the drilled hole).
Position of the bit. **1***
(The system keeps a steady check of the position of bit).

Hammer type on rig **5006**
Top Hammer **0***
ITH hammer **1**

If ITH hammer selected the system will show distance
from hole bottom on the upper display and the position of the
bit on the lower display when the rod from extracted in the hole.

Measurement units **5007**
Metric **0***
US **1**

Not Used **5008**
0*

GPS Compass antenna mounting **5009**
Primary antenna to right **0***
Primary antenna forward **1**
Reefers to the chassis of the rig.

Laser receiver/GPS Level **5010**
Laser receiver used **0***
GPS Level system used **1**

Reset by drilling signal 4 **5011**
Not used **0***
Used **1**

Automatic angle/length presentation **5012**

With used function and switch Angle/Pause/Length in position Length,
the angle of the feeder will be shown until the drilling signal is set to on.
Then the displays changeovers to show penetration rate and drilled length.
Zero-setting the hole length is possible to do in standard procedure, when the drilling signal is set to off.

Not used	**0***
Used	**1**

WiFi for remote display **5013**

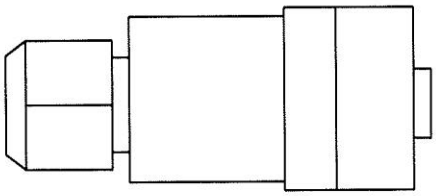
WiFi off	**0***
WiFi active	**1**

By pressing Σm (total) again the system will go to the start of the setup program again with 0099 on the lower display. This is useful for checking the setup.
To exit setup mode, shut the system off

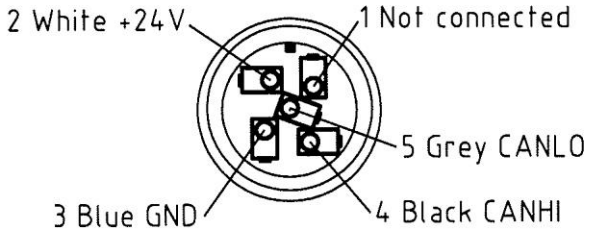
5 Checking and setting summary

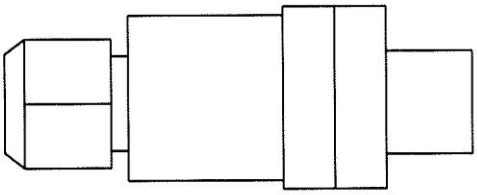
Checking No code		Setup Code=99	
9000	**Application**		
9001	Selected application program		
1	Check of node	1	Node on/off Length transducer
2	Check of node	2	Node on/off Angle transducer
3	Check of node	3	Node on/off Sight
4	Check of node	4	Node on/off Boom joint transducer
5	Check of node	5	Node on/off Swinging cab transducer
12	Check of node	12	Node on/off GPS Compass
13	Check of node	13	Node on/off GPS Level
1000	**Measurement values**	**1000**	**Direction node**
1011	Length transducer	1011	Direction length transducer
1012	Laser receiver signal		
1021	Side angle		
1022	Inclination angle		
1031	Sight	1031	Direction sight
1041	Boom joint transducer	1041	Direction boom joint transducer
1051	Swinging cab transducer	1051	Direction swinging cab transducer
1121	GPS Compass		
1131	GPS Level		
2000	**Zero setting**		
2021	Zero setting side angle		
2022	Zero setting inclination angle		
2031	Zero setting sight		
2041	Zero setting boom joint transducer		
2051	Zero setting swinging cab transd.		
3100	**Operator settings**		
3101	Setting of laser length		
3102	Setting of rod length		
3103	Measurement resolution		
3200	**Output signals**		
3201	Test of stop signal		
3300	**Input signals**		
3301	Check of drilling signals		
3401	Check of Absolute/Relativ Switch		
3501	Check of Angle/Pause/Lengt Switch		
		5000	**System settings**
		5001	Angle transducer side 1=back 2=left 3=front 4=right
		5002	Selection of length transducer
		5003	No of drilling signals
		5004	Hole length/hole depth 0=length 1=depth
		5005	Hole length/bit pos 0=hole length 1=pos bit
		5006	Hammer 0=top 1=ITH
		5007	Units 0=metric 1=US
		5008	Not used
		5009	GPS Compass antenna mounting
		5010	Laser receiver/GPS Level
		5011	Length reset from drilling signal 4
		5012	Automatic showing of angles-length
		5013	Wifi for remote display

Signal cables connection



Signal cable
connection
sleve connector
Anslutning
honkontakt





Signal cable
connection
pin connector
Anslutning
hankontakt