Operator Guide

TLD870

Static Pallet Dimensioner

METTLER TOLEDO

Operator Guide

Version History

Version	Release Date	Author	Comments
0.0.1	09.July.2020	ean, AH, Otto, Et al.	First draft
0.0.2	11.Nov.2020	AH	Minor changes
1.0.0	02.Jan.2021	AH, Et al.	First release

Copyright Note

Safety Instructions

General Precautions

To avoid hazards, following recommendations should be observed:

- Check whether the power rating of TLD870 kit corresponds to power mains before connecting.

- Grounding (Protective earthing) is compulsory and should be used in combination with the safety power breakers (Fault current circuit breaker)/fuse. The rating of the breaker/fuse in the power mains must correspond to the current intensity in the input power cable of the system. Fixed wiring of the power cable to a power outlet is compulsory, according to VDE0160.

- System must only be connected to a properly earthed (grounded) safety outlet, which complies with the electrical safety standards valid in that country.

- Do not remove covers or try to service the instruments used in TLD870, unless trained and qualified to do so. Any warranty will be void, if work inside instruments is done by personnel not qualified by Mettler-Toledo Cargoscan AS (MTCSN).

- Mechanical environmental class M1: This class applies to instruments used in locations with vibration and shocks of low significance, e.g. for instruments fastened to light supporting structures subject to negligible vibrations and shocks transmitted from local blasting or pile-driving activities, slamming doors, etc.

- Observe all the safety recommendations when working with electro-mechanical equipment in a system.

- Always keep a sufficient safety distance from the forklift truck.

- It is illegal to connect any RJ45 connector used in the TLD870 system to any external public telecommunication network as among others it might cause loss of information, breakdowns in network integrity, or breaches in security.

- TLD870 is only intended for static dimensioning of pallets as indicated in our order confirmation. Using it for a purpose other than this will increase the risk of injuries, damages or accidents and is therefore not permitted.

- All data or signal cables connected to 800-S must be shielded by a metal shield, and the shield must be properly connected to a metal housing around the connector. Failure to provide proper shielding of any data or signal cable will invalidate the EMC approvals of the instrument.

Electrical Safety

To avoid electric shock the following recommendations should be observed:

- The electrical equipment must be installed, operated, serviced and maintained by qualified electrician. The installation must be according to the electrical engineering rules and safety instructions defined by MTCSN. No responsibility is assumed by MTCSN, if these requirements are not respected.

- Start up the system only after grounding (protective earthing) test has been passed.

- The electric parts of the system must be regularly inspected and thoroughly checked. Any faults – e.g. loose connections or charred cables – must be cleared immediately. Do not operate unsafe equipment!

Laser Classification – Background

The 800-S dimensioner used in the TLD870 system is based on a visible (red) laser diode emitting a wavelength of 658nm. The product is classified as class 2 laser product in accordance with the following standards:

CFR 1040.10: Used by US Federal Drug Administration (FDA). It is the law in the USA to classify any product sold in the US according to this norm.

IEC 60825: The standard shall be used when classifying products for the European (EU) market. Products bearing the CE mark are classified according to this standard. This standard is accepted in most other countries too.

In the USA, FDA has stated that product classified according to this standard will be treated equally as CFR 1040 (FDA Laser Notice 50).

Class 2: This classification is used for visible laser products only.

Class 2 lasers are considered eye safe for practical use but not eye safe during continuous (long time) viewing. The laser safety classification in 800-S is done with a stationary sweep mirror. This is worst possible situation concerning radiation hazard. During normal operation, the mirror sweeps the laser beam across the scan field, which means that the user is exposed to laser light much below the exposure times used in the safety calculations.

The laser diode output power of each 800-S is max. 4.1mW. This is the max. acceptable power level for this product within IEC 60825, Class 2. CFR1040 class 2 allows higher output power than IEC 60825.

Table: Laser output power

Wavelength	Max Laser Output Power	Mean power at front (at Max output)	Laser Class
Visible (658nm)	4.1mW	0.18mW	IEC: Class 2 FDA: Class 2

Mean Laser Power: Output Power from the laser diode.
Mean Power at Front: Mean Power collected by the eye of an observer located at the exit window of the instrument (the pupil of the observer's eye is assumed to be Ø=7mm). This power is measured with the polygon rotating.

800-S used in TLD870 complies with all requirements of the standards referred on laser warning label.
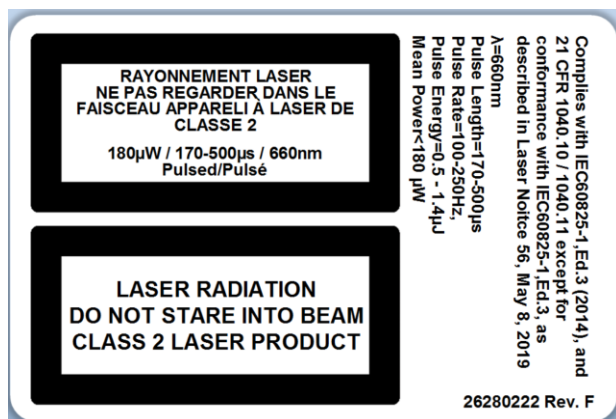
*Laser Label, Class 2, in accordance with IEC60825 and CFR1040.10. Left. Place on the side. **Right**. Warning label placed next to the laser exit window. (For illustration purpose only, background color may vary)*

Short time viewing is not considered hazardous. No special precautions are required around the instrument, as the normal eye aversion/blinking reflex will protect the eye from long time exposure. In addition, as laser is visible, the operator knows the location of the laser beam and the risk for accidental direct viewing is much reduced.

Note that longtime viewing of diffuse reflections (i.e. viewing the laser scan line on a surface) is safe under all circumstances.

Direct reflections from mirror type surface should be treated identically to direct viewing of the laser beam. Because the light is spread out from the exit window of the product, the power level decreases with distance. This means that from a laser safety point of view, the risk decreases with increased distance.

Laser Safety Precautions

In general, the following recommendations apply concerning laser safety:

- Do not mount 800-S in a position where the laser beam may hit the eyes of people unaware of its presence (e.g. with laser beam aiming at a door, stairway or workstation). This does not apply to trained service people doing installation, maintenance, and service, as they should be aware of the presence of the laser.

- Avoid direct viewing into the laser beam unless necessary (general recommendation that also applies for Class 1 lasers). If direct viewing is necessary, reduce the exposure time to a minimum and do the viewing at maximum possible distance.

- Never look into the laser beam through any type of optical magnification instrument such as binocular, magnifying glass, SLR camera view finders or similar.

- If the front cover of the 800-S dimensioning head is removed, the laser radiation hazard is not increased unless the laser beam inside the casing is intercepted and redirected with a mirror or similar optical device. The instrument has built-in features to switch off the laser when such interception occurs, or if the laser beam is somehow interrupted. These safety mechanisms comply with the requirements of the laser safety standards. However, as a general precaution, it is not recommended to fully rely on these features. Therefore, when working inside the unit, observe the following:

    - Turn power OFF unless power on is absolutely necessary.
    - Do not intercept the laser beam with reflective material or optical components (mirrors or similar).

Other Safety Precautions

In addition to the Laser Safety Precautions, the following should be observed to avoid electrical and other hazards:

- Always do a visual inspection before using the system. If any sign of damage is detected on the mechanical frame, mountings, instruments or cabling, turn off the power and contact service personnel.

- Ensure that dimensioners are mounted properly; failure to do so may cause serious injuries.

- If service or repair work inside the dimensioner has to be carried out while its polygon is rotating, safety goggles must be used to prevent eye injuries if objects or debris are thrown off the rotating polygon.

- Do not use the instrument in an environment where there are explosive materials.

- To avoid injury, misuse of this device, or property damage, please read and comply with all safety Information and operating instructions mentioned in the available product documentation.

Preface

- This document covers system overview, system user interface and error codes. The goal of the document is to help and guide the technician to properly operate TLD870 system.

- Technicians or professionals operating the TLD870 system should have basic mechanical, electrical and software knowledge, and should be trained by MTCSN to handle all components correctly, especially the 800-S.

- Important notes in this document are in bold italic font.

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- For technical information, white papers, demonstrations, webinars and other resources, please visit:
  https://www.mt.com/no/no/home/search/library

- Contact information to Global Support and Training Center:
  We have MTCSN support desk cargoscan.productsupport@mt.com

- TLD870 is designed and developed in Norway. For further product information, contact:

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Operator Guide

Table of Contents

1 Introduction

This document provides technical information about operation of both standard TLD870 and OPRI Kit TLD870 systems. The document is written for technical users and operators of the product.

When changes and updates are made to the instrument, either MTCSN will issue updates to this manual or a new revision of the entire document will be issued. Contact MTCSN for updates and/or new releases.

1.1 Product Overview

TLD870 is a fast and precise static dimension measurement system that dimensions palletized freight having irregulars, cubical cylindrical, hexagonal, triangular and toroidal shapes. The object to be measured is placed on the measuring platform and must stand still during measurement. It is essential to have only one object within the measuring platform at a time. Any sort of truck or trolley used to transport the pallet must be removed from the measuring field during measurement.
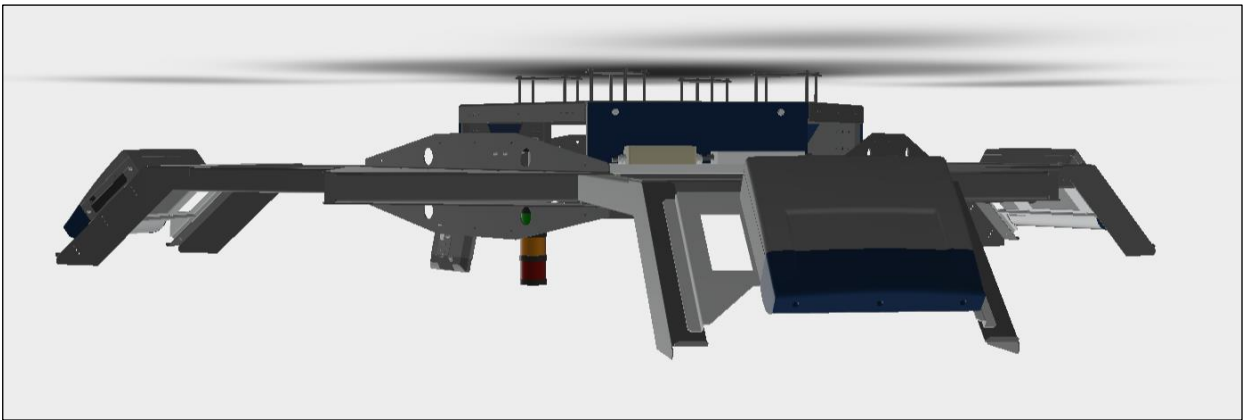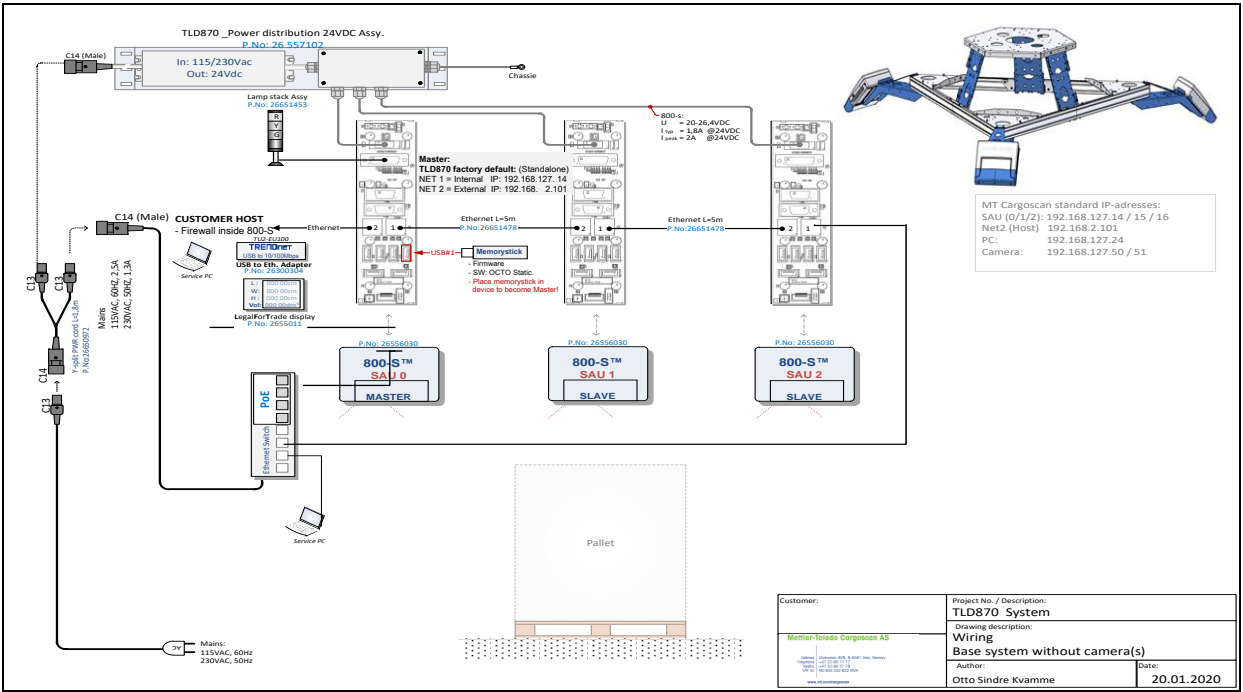

Figure 1.1 Low hat TLD870 OPRI Kit

Figure 1.2 TLD870 base system cabling overview

For approved object sizes and measurement accuracy, see "Technical Data", section 1.3.

Dimensioners (800-S)

To measure static objects, TLD870 features three 800-S dimensioners, one in each corner of the equilateral triangle (satellite). 800-S uses FMCW, which gives long range, precise measurement and the ability to measure velocity.

One of the 800-S contains a firmware memory stick and is referred to as the master dimensioner, while the other two are referred to as slave dimensioners.
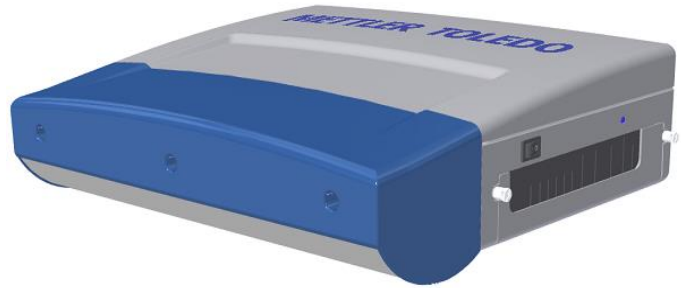
Figure 1.3 800-S Dimensioner

Each 800-S has a connector board on one side of the instrument, with the following connectors:
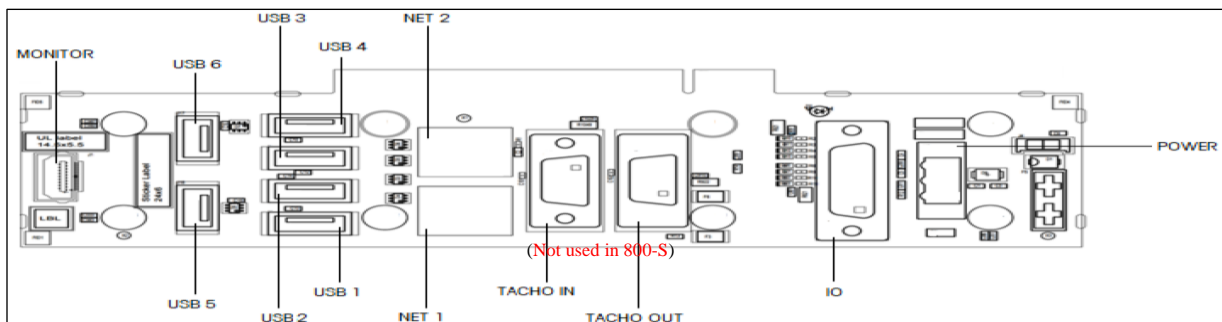
Figure 1.4 Connector board

Power distribution assembly

The TLD870 power distribution unit consists mainly of a 24V DC power supply and a junction box, mounted on a metallic plate.
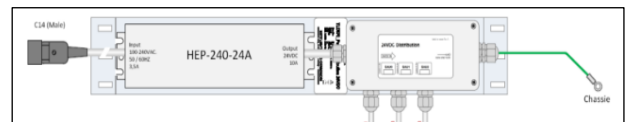
Traffic light

TLD870 has a three-coloured traffic light (signal tower). Red light indicates error, yellow light means measurement in progress whereas green light means ready to measure.

Ethernet switch on Satellite

TLD870 uses an 8 port unmanaged PoE network switch to connect various devices to the wired network.

Legal for trade display

Typically, the 7'' inch monitor displays status of the system i.e. READY etc. and LFT information. After a measurement, it shows Length, Width, Height and Result, until it is timed out to normal mode again.

OCTO DataCapture

MTCSN provides OCTO™ DataCapture STATIC software for TLD870 that takes information from different devices - dimensioner, scale, barcode reader and camera - and sends it to the host. Custom applications can be configured to improve productivity and sorting efficiency from its basic platform.

Camera(s) (Optional)

External dome network camera(s) can be used to capture the image of the objects under measurement. It comes in both singular and tw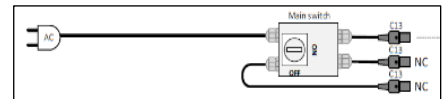o camera kit option. It is mounted under the satellite, either directly or through a telescopic arm. Camera(s) is accompanied with cable and is powered through a PoE Ethernet switch.

Main switch (Optional)

TLD870 can be equipped with a mains switch, which can be used to power ON/OFF all three dimensioners and other accessories on satellite.

Handheld BCR (Optional)

Handheld barcode reader is used to scan the barcode of the object under measurement. It is connected to system either through an Ethernet switch, Workstation or Independent IPC.

Independent IPC (Optional)

OCTO STATIC can be hosted on an independent IPC. TLD870 offers both Linux and Windows operating system IPC, CNC490.

Scale and weighing terminal (Optional)

In TLD870, a scale with a weighing terminal can be used to obtain the weight of the pallet additionally i.e. Floor scales, Forklift scales or Scooter scales with corresponding weighing terminal etc. These are interfaced with OCTO Static running on either 800-S Master, Workstation with IPC or a separate IPC.
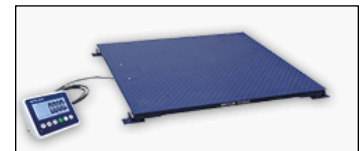
Workstation (Optional)

MTCSN offers a comprehensive workstation, which among others is used to initiate measurement, display results, collect additional information about the object being measured via barcode dimensioners or keyboard data entry.

1.2 Other optional features

- Tare capability
- Remote display
- Camera illumination

1.3 Technical Data

Trade Name	TLD870 Static Pallet Dimensioner
Object Shape	Irregulars, cubical, cylindrical , triangular, hexagonal and toroidal
Object Surface Characteristics	All surfaces (Except transparent and mirroring)
Maximum Object Size (L x W x H)	Approved by NTEP: 98 x 98 x 102 inches (249 x 249 x 260 cm)
	Approved by MID: 250 x 250 x 260 cm
Minimum Object Size (L x W x H)	Approved by NTEP: 12 x 8 x 3 inches (30 x 20 x 8 cm)
	Approved by MID: 20 x 20 x 10 cm
Dimensioning Accuracy (L x W x H)	Approved by NTEP:
	±0.25 x ±0.25 x ±0.25 inches (±1 x ±1 x ±1 cm) :
	for objects from 12 x 8 x 3 inches (30 x 20 x 8 cm) to 72 x 72 x 72 inches (183 x 183 x 183 cm)
	±0.5 x ±0.5 x ±0.5 inches (±2 x ±2 x ±2 cm) :
	for objects from 72 x 72 x 72 inches (183 x 183 x 183 cm) to 98 x 98 x 102 inches (249 x 249 x 260 cm)
	Approved by MID: ±1 x ±1 x ±1 cm
Protrusion size (L x W x H)	Evaluated if greater than 2.95 x 2.95 x 2.95 inches (7.5 x 7.5 x 7.5 cm) (If multiple protrusions exist on one side, then only the largest protrusion will be accounted for)
Measurement time	Approx. 3 seconds
Throughput	Approx. 240 pallets per hour (dependent on operator)
Operating Temperature	-10°C to 40°C ***** (14°F to 104°F)
Power	100-240 VAC, 50/60 Hz, 3.0 A
Dimensioners	3 x 800-S
Laser type	Class 2
Interface	Ethernet / USB
Software Accessories	OCTO™ DataCapture Static

Configuration Options:

Customer Specific Interfaces	Yes

**Startup temperature should be 0°C or above. Power-supply specification or other limiting factors, such as legal-for-trade approval, may affect these values. See product label for details.*

1.4 References

Description	Link to IND Documentation SharePoint	Comm.
TLD870 Service Manual	http://one.mt.mtnet/team/DSMServiceDocuments/IND_TL	*Not released*
TLD870 Installation Manual	http://one.mt.mtnet/team/DSMServiceDocuments/IND_TL	*Not released*

1.5 Approvals

MTCSN 800-S dimensioner used in TLD870 is tested and found to conform the following standards:

Safety:	Safety requirements for electrical equipment for measurement, control, and laboratory use: • IEC 61010-1, Certificate Number: NA201810912
Laser Safety:	• IEC 60825-1:2007 & 2014, CB-certificate(s) number: SE-90585 & SE-90585
Electromagnetic Compatibility:	• IEC 61000-6-3:2007 + A1:2011 + 2:2005, IEC 61326-1, FCC CFR 47 Part 15, OIML R 129, Certificate Number: NA201810912

2 User Interface

2.1 OCTO Static HMI display

The Human Machine Interface (HMI) display is a normal full size graphical display. The main screen includes four sections: Legal Display, User Display, Control Buttons and Status Bar.

Figure 2.1: OCTO display's main screen

• **Legal Display** section has a primary display for measurement instruments showing current measurement results.

• **User Display** section shows various operator panels.

• **Control Buttons** section is used to activate several functions by clicking on the button.

• **Status Bar** shows additional information about the system

Please read corresponding OCTO Static manual for more details.

2.2 LFT Display

In normal **Ready mode,** LFT should be like:
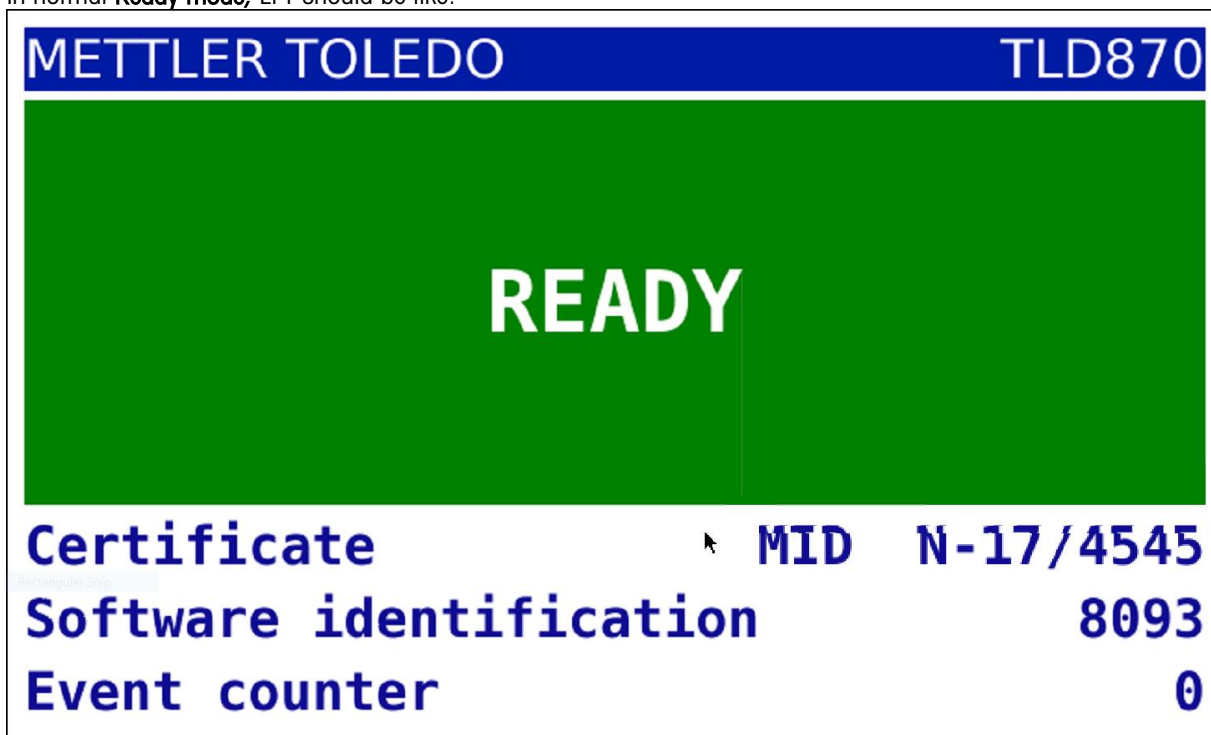
Figure 2.2 LFT In ready mode

While **Measuring** LFT should be, like:
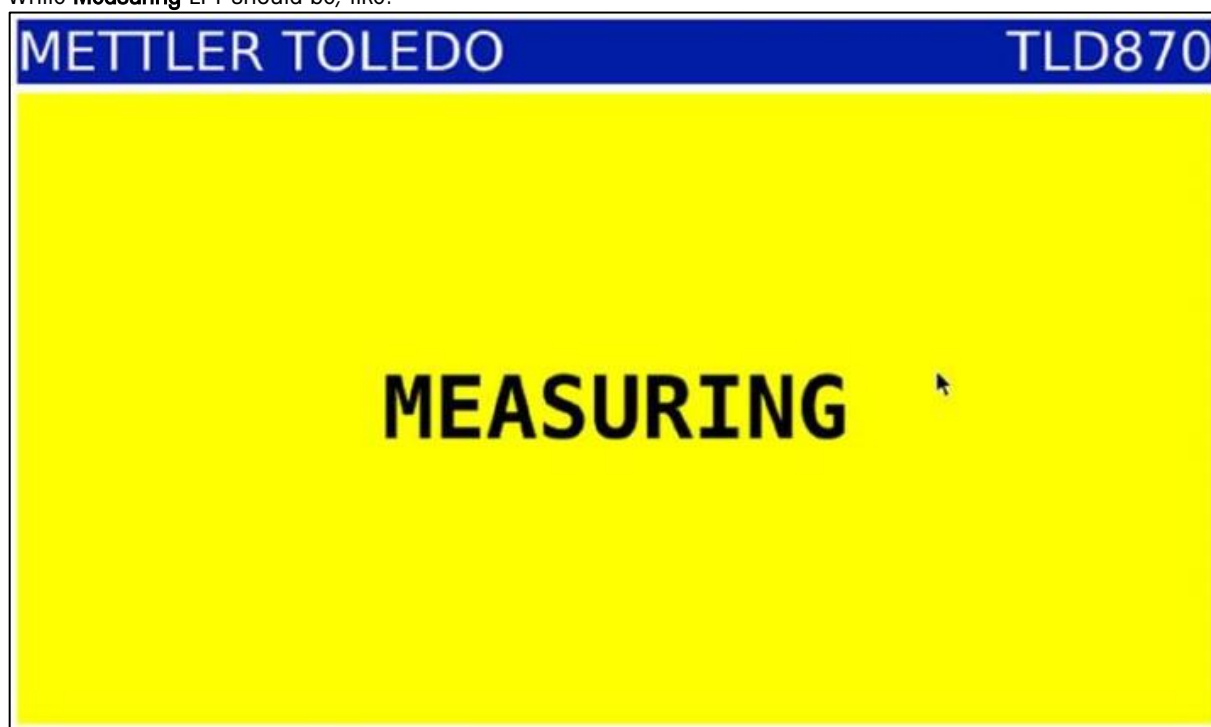
Figure 2.3 LFT in measuring mode

In case of **Fault/Wrong Measurement** LFT should be, like:
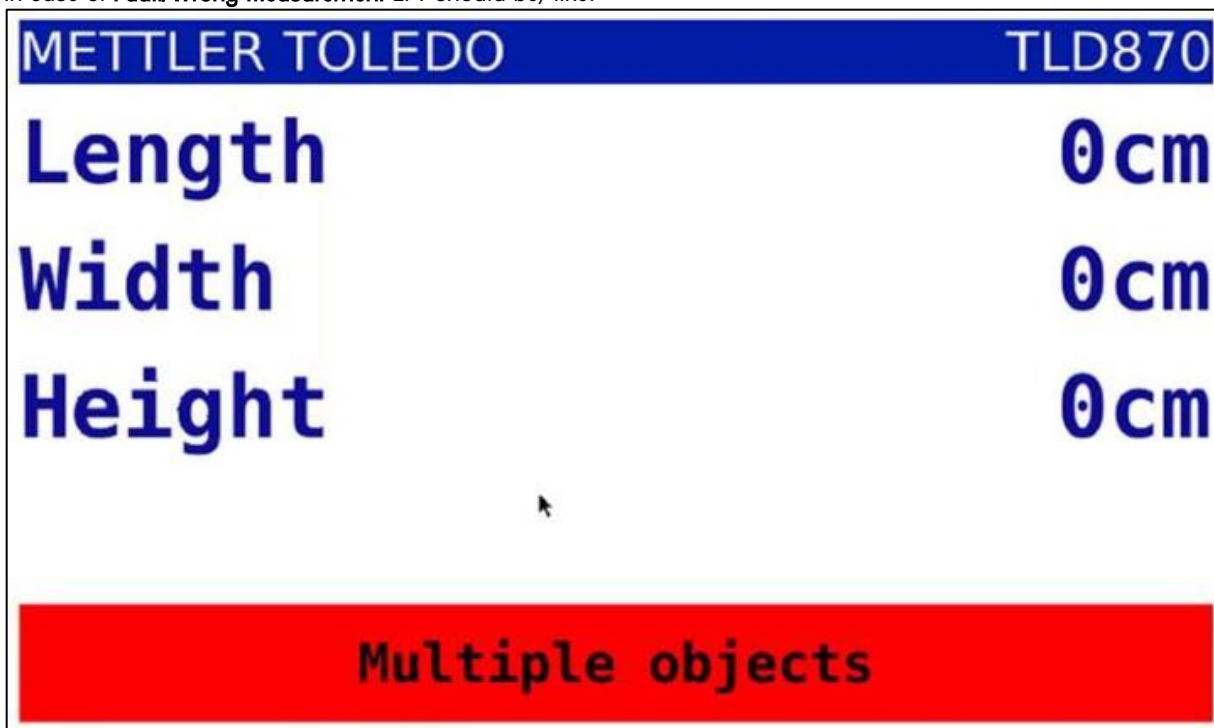
Figure 2.4 LFT in Faulty mode

Depending upon the error, it may or may not show the dimensions.

The same error can also be observed using **MT web Interface**:
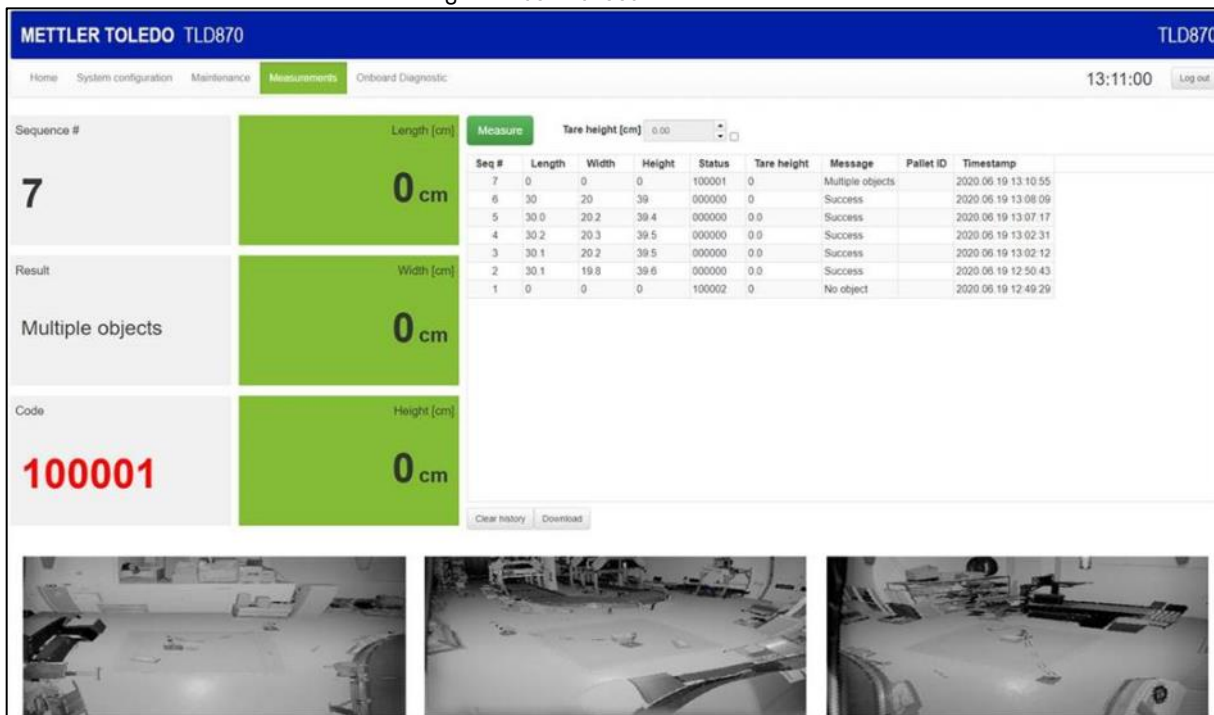
Figure 2.5 MT web Interface in Faulty mode

In case of **Correct Measurement** LFT should be, like:

Figure 2.6 LFT in OK mode

This correct measurement display will time out after few seconds and if system works OK will turn to Ready mode again.

This correct measurement can also be seen in **MT web Interface**:
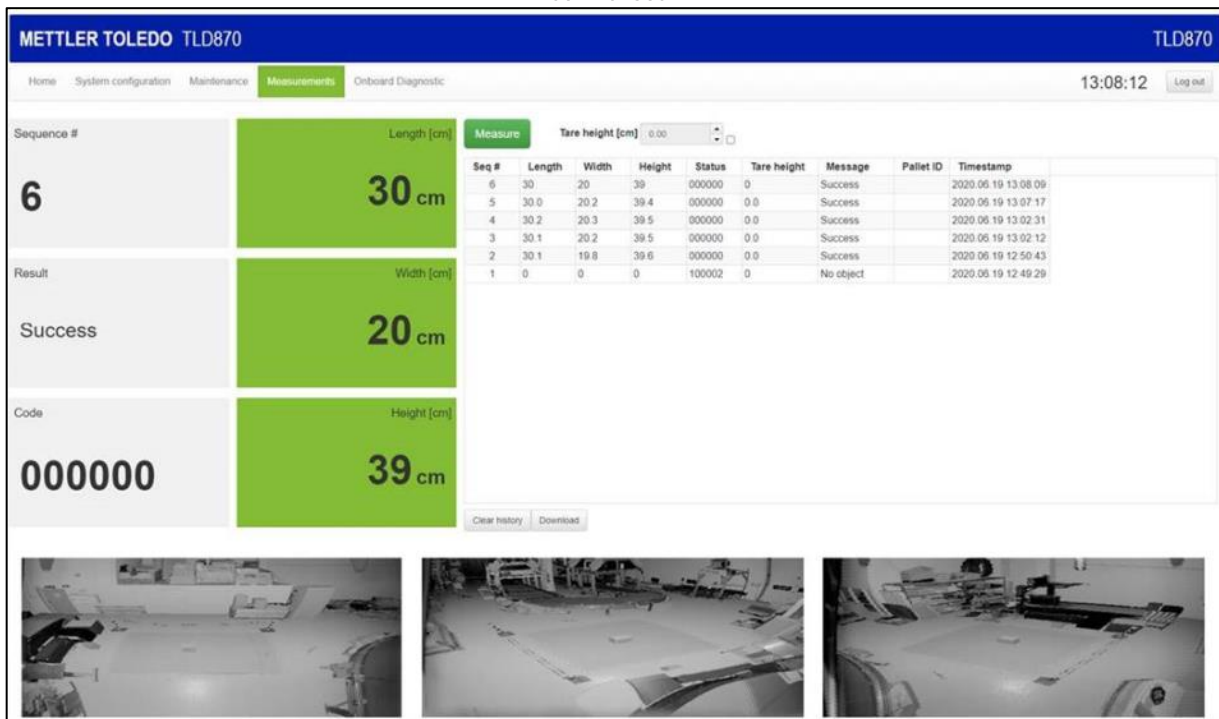
Figure 2.7 MT web Interface in OK mode

3 TLD870 Codes

TLD870 codes are transmitted to host as numerical codes and are classified into two main categories:

1) Measurement codes   2) Internal status codes

3.1 Measurement Codes

Measurement codes are 6-digit codes in hex which are transmitted together with the D (data) telegram for the object or when doing zeroing. The D telegram is sent from the dimensioner every time a new measurement is available. Each digit in measurement code represents certain measuring condition. These codes generally appear on both LFT display, MT web interface and on Octo. A zero in all digits represents an OK measurement, and this code is not shown on the LFT display.

Measurement codes are further classified into two sub categories:

i) Bitwise error codes   ii) Numeric error codes.

3.1.1 Bitwise error codes

The status field in the D telegram shall normally be interpreted as a bit field, unless bit 0x100000 is set.

A nonzero value indicates a single or combined set of bitwise error codes, thus for example code 000003 represents the combination of 000001 and 000002. A measurement can have multiple bitwise codes e.g. a pallet can simultaneously be too large in both length and height.

Figure 3.1 Bit-wise error code

Owing to hexadecimal representation (In bitwise error codes only), if alphabet(s) between A and F appears in the code, then that alphabet(s) needs to be converted from hex to decimal first. For instance if code "00000**A**" is reported then it needs to be converted into decimal value which gives "0000010". This conversion shows that the right most bit is a combination of other possible bitmask combination from the list below. Therefore, in the discussed example, it's a combination of 000002 "Outside right" and 000008 "Object too noisy".
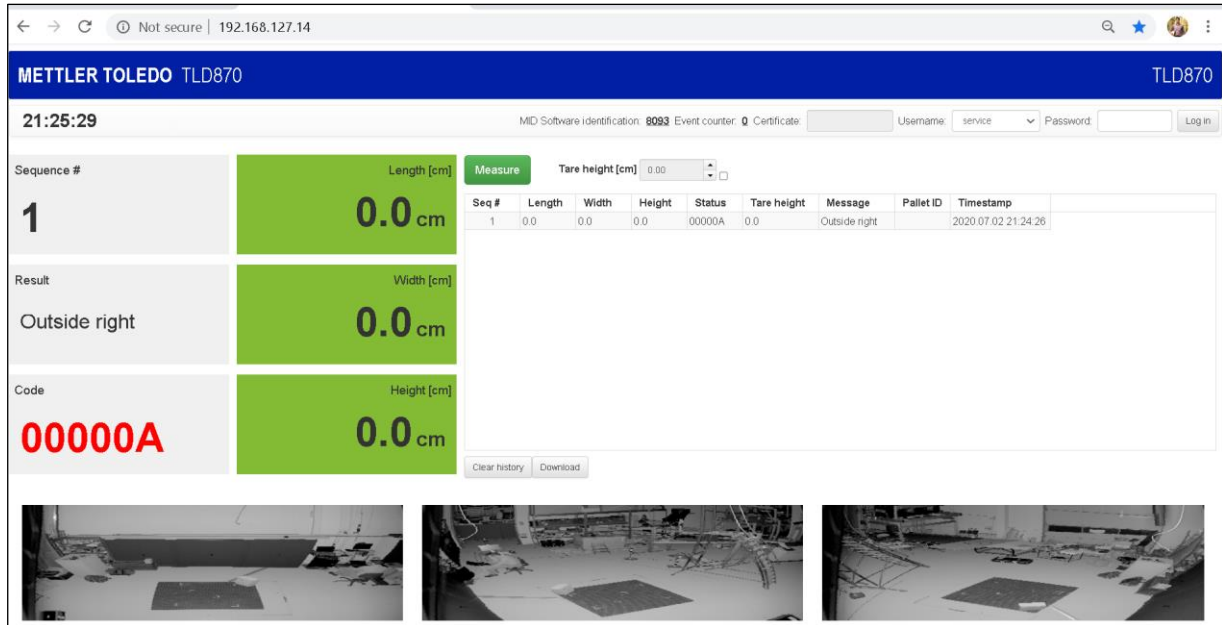
Figure 3.2 Bitwise error codes combination

It should be noticed that even for combined set of bitwise error codes only one code description can be displayed on the result section. Thus if needed from the bitmask list below and the displayed code and message the other combination must be inferred.

Bitwise error codes with bitmask and corresponding description are listed below:

Note: *Only first few combined set of bitwise error codes and their explanation are listed below, the rest can be inferred.*

Bitwise error code	Bitmask	Message	Description
000001	0x00000001	Outside left	Object is outside the measurement area on the left side with respect to SAUO
000002	0x00000002	Outside right	Object is outside the measurement area on the right side with respect to SAUO
000003 (Combination)		*(Only one of the bitwise error code description will be shown here)*	Object is outside the measurement area both on the right side and on the left side with respect to SAUO
000004	0x00000004	Obsolete (clipped old)	Obsolete error code. This should not happen

000008	0x00000008	Object too noisy	The outline of the object, as seen from above, was too complex for the software to find an enclosing box. The error code text assumes this must be a "noisy" object, e.g. dark color, or an object that has not been seen correctly.
000009 (Combination)		(Only one of the bitwise error code description will be shown here)	Both "Outside left" and "Object too noisy"
00000A (Combination)		(Only one of the bitwise error code description will be shown here)	Both "Outside right" and "Object too noisy"
000010	0x00000010	Length or width too small	The width or length of the pallet is smaller than the minimum size set.
000011 (Combination)		(Only one of the bitwise error code description will be shown here)	Both "Outside left" and "Length or width too small"
000012 (Combination)		(Only one of the bitwise error code description will be shown here)	Both "Outside right" and "Length or width too small"
000020	0x00000020	Length or width too large	The width or length of the pallet is larger than the maximum size set
000040	0x00000040	Shadow error occurred	Parcel in the shadow of another (at least 3 corners must be seen)
000080	0x00000080	Profile mousetrap error occurred	
000100	0x00000100	Height too small	The height of the pallet is lower than the minimum height set
000200	0x00000200	Height too large	The height of the pallet is taller than the maximum height set
000400	0x00000400	Package is non cuboidal	The objects match to a rectangular box is not as close to a cuboidal object as required
000800	0x00000800	Splitting problem	The object or group of objects is too complex for safe measurement
001000	0x00001000	Bad measurement	Length and width was not found due to object shape or features with measurement background or noise problems
002000	0x00002000	Failed to compute height	Height was not found due to object shape or features with measurement background or noise problems
008000	0x00008000	Out of memory	
010000	0x00010000	Failed to compute square box	
020000	0x00020000	Clipped rear end	
040000	0x00040000	Clipped at front	
800000	0x00800000	Object contains a hole	

3.1.2 Numeric error codes
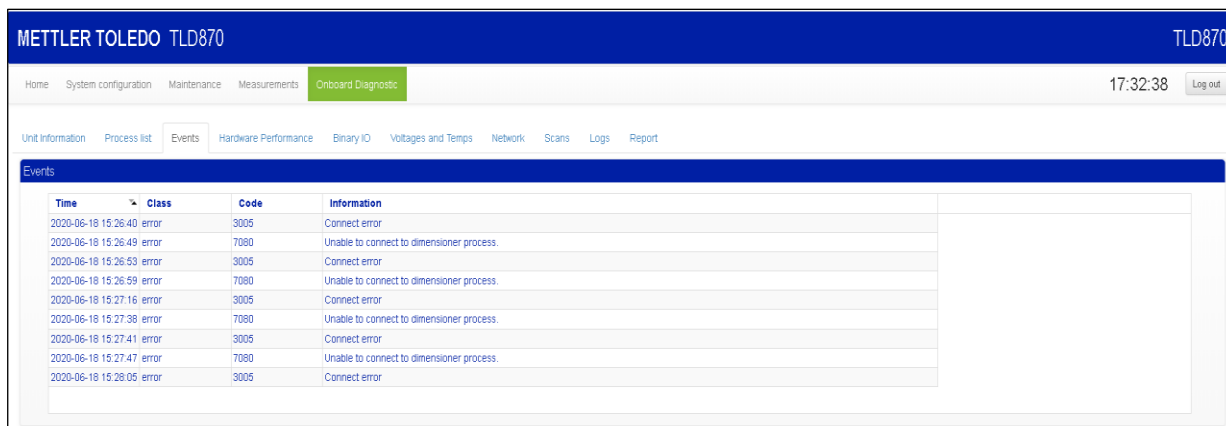
If bit 0x100000 is set, the field shall be interpreted as a single error code. All of these codes start with 100xxx and are generated only when something goes wrong.

Sequence Code	Message	Description
100001	Multiple objects	More than one object was seen inside the measuring area during measurement.
100002	No object	No objects seen in measuring area
100003	Tower error	The item is both thin and tall, and may be unstable (height > 3x width)
100004	Tare error	The tare height is not given according to the set resolution, or the tare height is above the upper limit of 20 inches
100006	Scanner's field of view is blocked	
100009	Warm-up state	
100010	The electronic seal is broken	
100013	Multiple indices	
100016	Stacked objects	
100017	24V supply voltage out of range	
100020	Polygons not synchronized	

3.2 Internal status codes

Internal status codes are 4-digit codes which are generated by TLD870 software. These codes are reported whenever a predefined situation occurs in the software or hardware of the instrument. These codes are transmitted with either the zero status telegram or the general status telegrams.

Internal codes are logged into Events with a time stamp and can be found under "Onboard Diagnostic" tab, subtab "Event".

Figure 3.3 Internal status codes

The software of the TLD870 is divided into separate layers. Each layer can generate its own set of status codes.

The first digit of the status code represent its module:
2 -> Module Sau
3 -> Module Saulib (communication between sau and dims)
4 -> Module Dims input (layer combining data from multiple dimensioners)
5 -> Module Dims
7 -> Module Hostem

From this code, the location of problem and whether it's a warning or an error can be identified.
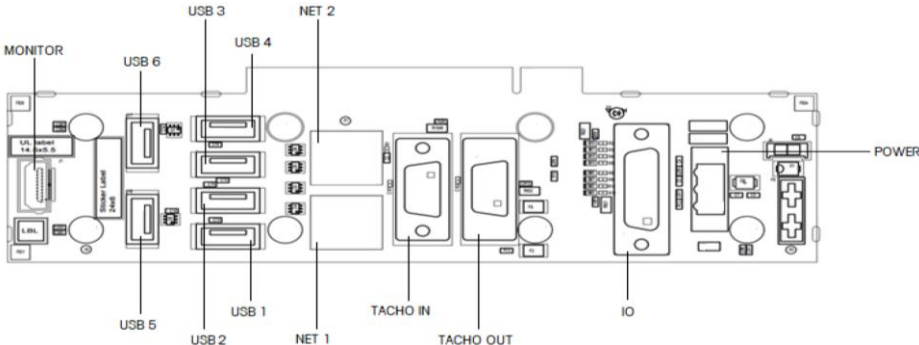
Code	Type	Description
2000	Error	Sau communication protocol error.
2001	Warning	Sau communication protocol warning.
2010	Error	Sau protocol error.
2020	Error	Invalid argument in message.
2030	Error	Insufficient setup values for request uploaded
2031	Error	Zeroing data it too noisy, the file is missing or it has bad checksum
2032	Error	The 800-S mirror calibration are broken, maybe this is a swap sau and restoring of factory calibration is not done
2040	Error	Client is incompatible with server protocol
2050	Warning	Input source is not open.
2100	Error	Sau internal error.
2101	Warning	Sau internal warning.
2120	Warning	Request not fullfilled within allocated time slot.
2130	Warning	Server is resetting
2140	Warning	Sau not ready
2150	Warning	Asynchronous data transfer stopped.
2400	Error	Error in sensor interface reported by driver.
2401	Warning	Warning in sensor interface reported by driver.
2410	Warning	The polygon is not running at the correct speed.
2420	Error	The reported references sample is invalid.
2421	Warning	The polygon sync signal is missing.
2430	Warning	DMA transfer has stopped.
2470	Error	Unable to read binary input.
2480	Warning	General IO failure.
2490	Error	Access to sensor hardware failed.
2500	Warning	Failed to flush buffers.
2510	Warning	Unable to open source.
2520	Warning	Scene not found
2610	Error	Too many gridcells in configuration - X pitch too small
2620	Error	Sau out of memory error
2630	Warning	Unexpected large jump in pulse counts between scans
2635	Warning	Ioctl failed to set tacho to requested value
2640	Warning	Sau busy handling higher-priority client
2650	Warning	Client interrupted by higher-priority client
2660	Error	The polygon is off, but should be running.
2670	Error	The laser is off, but should be on.
2680	Warning	One or more temperature measurements are out of range.
2690	Error	One or more voltage measurements are out of range.
2700	Error	Failed to set tacho mode.
2710	Error	Unable to turn polygon on/off.

Code	Type	Description
2720	Error	The reference surface has an error.
2730	Error	The reference surface does not have the correct signal level.
2820	Error	Scan mirror not moving.
2830	Error	Mirror moved only partially
3005	Error	Sau process communication error.
3010	Error	Async command started; use sauProcess to get response
3020	Error	Tried to start second command while async command is running
3030	Error	Sau process received oob data while waiting for response
3040	Error	Invalid
3050	Error	Invalid argument
3060	Warning	SAU process communication warning
3061	Warning	Timeout occured
3070	Warning	Read error
3080	Warning	Short read
3090	Warning	Out of sync
3100	Error	Saulib out of memory
3110	Warning	Write fault
3120	Warning	Short write
3130	Error	Invalid opcode
3140	Error	Socket error
3150	Error	Connect error
3160	Error	Socket error (nsocket)
3170	Error	SAU prosess internal error.
3171	Error	Environment not set
3180	Error	Socket pair error
3190	Error	Fork error
3200	Error	Open error
3210	Error	Select error
3220	Error	Select error
3231	Error	Message checksum mismatch
3230	Error	Invalid socket
3240	Error	End of file (before any data was read)
4040	Error	System uncalibrated. Please calibrate.
4530	Error	Too many dimensioners in system.
4540	Error	Failed to get local dimensioner parameters in configuration file.
4550	Error	Failed to upload dimensioner parameter.
4620	Error	Out of memory error for Dims input.
4630	Error	Internal error for Dims Input.
4631	Error	Inconsistent width error.
4640	Error	Wait timeout.
4650	Error	End of file error.
4680	Error	Belt not moving error.
4681	Warning	Warming up.
4682	Error	Belt running in reverse.
4690	Error	Timeout error.
4700	Error	Invalid input error.
4710	Error	Syscal error.
4720	Error	Unable to open file error.
4741	Error	Measuring was interrupted by a host request.
4751	Error	Connected client crashed.

Code	Type	Description
5130	Error	Too long package seen in measurment field.
5140	Error	System is not able to initialize properly.
5150	Error	Dims process out of memory.
5160	Error	Checksum mismatch for calibration file.
7002	Error	The CS2200 display cannot be initialized.
7003	Error	The encoder device cannot be initialized.
7004	Error	One or more binin lines are misconfigured.
7005	Error	One or more binout lines are misconfigured.
7010	Error	Host request errors.
7011	Error	Host request socket error.
7012	Error	Host request config error.
7013	Error	Host request connect error.
7014	Error	Host request timeout error.
7015	Error	Host request closed error.
7016	Error	Host request connection failed error.
7020	Error	Host response error.
7021	Error	Host response socket error.
7022	Error	Host response config error.
7023	Error	Host response connect error.
7024	Error	Host response timeout error.
7025	Error	Host response closed error.
7026	Error	Host response connection failed error.
7100	Error	Host read-only error.
7101	Error	Host read-only socket error.
7102	Error	Host read-only config error.
7103	Error	Host read-only connect error.
7104	Error	Host read-only timeout error.
7105	Error	Host read-only closed error.
7106	Error	Host read-only connection failed error.
7030	Error	NVS focus host interface error (Bcr read forwarding interface).
7031	Error	Host NVS focus host interface socket error.
7032	Error	Host NVS focus host interface config error.
7033	Error	Host NVS focus host interface connect error.
7034	Error	Host NVS focus host interface timeout error.
7035	Error	Host NVS focus host interface closed error.
7036	Error	Host NVS focus host interface connection failed error.
7040	Error	NVS focus system interface errors (focusing interface).
7041	Error	Host NVS focus system interface socket error.
7042	Error	Host NVS focus system interface config error.
7043	Error	Host NVS focus system interface connect error.
7044	Error	Host NVS focus system interface timeout error.
7045	Error	Host NVS focus system interface closed error.
7046	Error	Host NVS focus system interface connection failed error.
7050	Error	Host sorter interface error.
7051	Error	Host sorter interface socket error.
7052	Error	Host sorter interface config error.
7053	Error	Host sorter interface connect error.
7054	Error	Host sorter interface timeout error.
7055	Error	Host sorter interface closed error.
7056	Error	Host sorter interface connection failed error.

Code	Type	Description
7060	Error	Host camera interface error.
7061	Error	Host camera interface socket error.
7062	Error	Host camera interface config error.
7063	Error	Host camera interface connect error.
7064	Error	Host camera interface timeout error.
7065	Error	Host camera interface closed error.
7066	Error	Host camera interface connection failed error.
7070	Error	Host tap interface error.
7071	Error	Host tap interface socket error.
7072	Error	Host tap interface config error.
7073	Error	Host tap interface connect error.
7074	Error	Host tap interface timeout error.
7075	Error	Host tap interface closed error.
7076	Error	Host tap interface connection failed error.
7080	Error	Unable to connect to dimensioner process.
7081	Error	Unable to connect to registry process.
7090	Error	Host Octo read-only interface error.
7091	Error	Host Octo read-only interface socket error.
7092	Error	Host Octo read-only interface config error.
7093	Error	Host Octo read-only interface connect error.
7094	Error	Host Octo read-only interface timeout error.
7095	Error	Host Octo read-only interface closed error.
7096	Error	Host Octo read-only interface connection failed error.

Appendix A: (800-S Technical Specifications)

800-S Technical Specifications	
Equipment function:	Volume dimensioner
Power rating:	3.0 A, 24 VDC
Fuse:	3.0 A, slow
Power consumption:	Will vary, but normally approx. 44 W
Overvoltage category:	II
Size (WxDxH):	400 x 110 x 355 mm (15.74 x 4.33 x 13.97 in)
Mass:	Approx. 9.8 kg (21.6 lbs)
Enclosure:	Alumunium
Storage temperature:	-10°C to 50°C *
Humidity:	10-90%, non-condensing
Pollution degree:	2
Light source:	Laser diode, red, wavelength 658 nm
Laser:	Class II (2)
Connector board connections	
Ports:	Connector board:
POWER	
IO	
TACHO OUT	
TACHO IN	
NET 1	
NET 2	
USB 1 to USB 4	
USB 5 to USB 6	
MONITOR	
Connector board also contain Power On indicator LED, Fuses and Reset jumper.	

* Start conditions should be 0 C° or above.

Appendix B: (Measurement Principles)

Operation Mode:

The object to be measured is placed on the measuring platform. There must be only one object on the platform at a time. The object must stand still during measurement. If a pallet truck is used, the truck must be withdrawn from the measuring field during measurement. It is sufficient that the body and tower of the pallet truck are outside the measuring field. The forks of the truck may be partly inside the pallet without disturbing the measurement.

Typically the measuring platform includes a pallet scale for simultaneously weighing the pallet. If so, the requirements of the scale and the rest of the system must also be considered with regards to location of the truck during measurement.

Starting the measurement can be done by pressing a button on the system display, or via the host interface. A commonly used mode of operation is that the operator scans the pallet with a Bar Code Reader. When the Bar Code is validated by the system computer, a Start-Dim signal is given from that computer via the Host interface.

Other means of starting measurement may be implemented.

TLD870 Kit Working Principles:

The TLD870 Kit measures length, width and height of objects placed on the measuring platform underneath the system.

The system contains three 800-S dimensioning scanners. One of 800-S (containing FW USB) is set up as the Master, the two others as Slaves.

All three scanners scan the object in order to generate a 3D contour image of the object as seen from each scanner. The Master combines these three images into one 3D image of the entire object.

Because the three 800-S are mounted in an equilateral triangle configuration above the object, the combined image from the three scanners will be without blind spots caused by shadows from protruding parts on the object.

After generating a complete image of the object, the Master 800-S does a quality check of the pixels in the image before calculating dimensions. If the quality is acceptable, the dimensions of the object are calculated, and displayed on the system display and/or reported to the Host system.

If the quality of the recorded image is found to be inferior, or there appears to be features in the recorded image that may cause errors in the reported dimensions, the Master will issue a status code for that object.
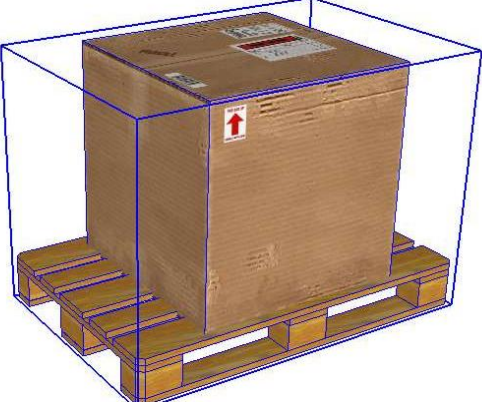
Dimensions may still be reported, but the status code indicates that these dimensions may be outside specified tolerances.

In Legal for Trade applications, the system may have to be set up to not report dimensions if any errors are found in the scanned image. This depends on national legislation. See the Letter of Approval in each country for details.

Taring:

The TLD870 Kit supports measuring with taring. This means that the user specifies a given tare height, and that the system proceeds to measure everything that is located above that height. In reality, this means raising the zero level of the instrument to the given tare height, and then measuring above that level.

The tare height is specified by the user upon initiating measuring.

With taring disabled, the dimensions of this object will be equal to the smallest box we can fit around the entire object. This means that the width and length will be determined by the pallet in this case, and not by the box on top.	If we use taring, and specify the tare height as the height of the pallet, the system will raise the zero level to the pallet height and measure everything above this. In this case, the pallet will be left out of the measurement. The length and width will be determined by the box on the pallet.

The taring feature has the following limitations:

Tare height must be given in a value that corresponds with the system resolution. For instance: If the resolution is set to 0.25 inches, 5.75 or 6.00 are legal values. 5.80 would then be an illegal value. If the user would try to give 5.80 as a tare height, the system would produce error 100004, shown as "bad tare" on the cs2200 display.
The system will only handle tare heights from 0 to 20 inches. If the user tries to give a tare height above 20 inches, the system will produce error 100004, shown as "Tare error" on the cs2200 display.

The maximum height that the system can measure (260cm/102inch) relates to gross height. If we place a 102 inches tall object on a 6 inches tall pallet, then the combined object is 108 inches tall. If we tare away 6 inches, the gross object is still 108 inches and the system will give an error code.

Object Requirements:

Shape: The system can measure objects of any shape within the defined limits of the measuring field. Flexible objects will be reported with the Smallest Enclosing Rectangle of the object as the object rests on the measuring platform. Please observe that the handling of such objects will change the shape such that it is impossible to verify that the measurements are correct. It's up to the user of the system to decide whether such objects shall be measured with the system.

Protrusions: The system will include protruding parts on the object in the reported dimension depending on the Protrusion value selected in MT web interface, size and surface properties of the protrusion.

By using default Protrusion settings:

- Protrusions larger than 75x75x75mm will be included in the measurement.
- Protrusions significantly smaller than 75x75x75mm will not be included in the measurement.

Surface:
Transparent/translucent: The surface of the object must not be transparent or semi-transparent. If light penetrates the surface, the size of the object will be reported too small. In many cases the quality analysis of the image before dimensioning calculation may reveal this, and the object will be reported with an error code. However, this cannot be guaranteed. It is therefore the responsibility of the user to determine whether the object is suitable for being measured.

Surface Gloss: High gloss surfaces may reflect the light away from the object, and not directly back to the 800-S. Such indirect travelling of the light may give wrong distance measurement. It may also happen that all the light is reflected off the surface and nothing returns to the 800-S. In such cases Range measurement will be very noisy. High gloss surfaces may therefore give measurements outside the specified accuracy. The 800-S system has been tested for measuring the following common types of high gloss surfaces without restrictions:

- Bare metal (steel and aluminum)
- Brushed stainless steel
- Black, glossy plastic foil
- Non-transparent shrink wrap and bubble wrap.

Please observe that the optical properties of these materials are not well defined. This list is therefore provided as a general guidance only. If objects with high gloss surfaces are to be measured, the user should verify that the system can handle such surface before putting the system into general service for such use.

Size:

Maximum Object Size (L x W x H)	<u>Approved by NTEP</u>: 98 x 98 x 102 inches (249 x 249 x 260 cm)
	<u>Approved by MID</u>: 250 x 250 x 260 cm
Minimum Object Size (L x W x H)	<u>Approved by NTEP</u>: 12 x 8 x 3 inches (30 x 20 x 8 cm)
	<u>Approved by MID</u>: 20 x 20 x 10 cm
Dimensioning Accuracy (L x W x H)	<u>Approved by NTEP</u>: ±0.25 x ±0.25 x ±0.25 inches (±1 x ±1 x ±1 cm) : *for objects from 12 x 8 x 3 inches (30 x 20 x 8 cm) to 72 x 72 x 72 inches (183 x 183 x 183 cm)* ±0.5 x ±0.5 x ±0.5 inches (±2 x ±2 x ±2 cm) : *for objects from 72 x 72 x 72 inches (183 x 183 x 183 cm) to 98 x 98 x 102 inches (249 x 249 x 260 cm)* <u>Approved by MID</u>: ±1 x ±1 x ±1 cm

Centering: The object is scanned from all sides by the three dimensioning heads. In order to for these scanners to get the best possible view of all sides of the object, the object should be well centered in the measurement field. This is particularly important for objects with "difficult" surfaces that are very glossy and/or very dark surfaces.

Legal for Trade Applications: In Legal for Trade applications national requirements must be observed with regard to object requirements. Please check the Letter of Approval for the product in each c