

# 2D IR-TRACC Zero-Position Verification

Publication Date: October, 2015



Humanetics has developed a Zero-Position Verification procedure for 2D IR-TRACC assemblies (Infra-Red Telescoping Rod for the Assessment of Chest Compression). In this procedure the parameters 'Zero-Position Intercept' and 'Offset Angle' are obtained from a 2D IR-TRACC assembly.

The Zero-Position Verification Procedure is a further development of and replaces the 'IR-TRACC Absolute Length and Angle Calibration' published in service bulletin October 2014. The main difference of the new procedure is in the template that gives additional results to help implementation of the parameters in various measurement systems. The previous procedure was offered as a service from Humanetics Europe GmbH, the Zero-Position Verification is being rolled out in all Humanetics Satellite labs in near future to serve our customers worldwide. The fixture is also being offered for sale in a boxed kit that includes hardware, software and a manual with detailed instructions. Customers can contact their local sales representatives to obtain a quote.

## Background

Euro NCAP implemented the WorldSID dummy with 2D IR-TRACCs in their 2015 protocols. The Euro NCAP injury parameter is based on the lateral compression of the ribs. This requires calculation of the rib position in a co-ordinate system fixed to the thoracic spine. The Zero-Position Verification Procedure was developed to facilitate this and is applicable to the 2D IR-TRACCs implemented in the WorldSID dummies and also the Q10 dummy.

The WorldSID and Q10 dummy manuals provide further detailed information how to implement

the verification and calibration parameters in the data acquisition system and/or post processing software. When the zero-position parameters are implemented correctly in the DAS system, the mm output of the IR-TRACC corresponds to its radius: the spine box-pivot to rib-pivot distance. The most significant difference is that the mm radius output of the IR-TRACC will reduce with increasing rib compression, in contrast to the standard result.

## Zero-Position Verification

The new procedure is carried out in three steps.

In the first step displacement and angle calibration of the IR-TRACC and angle sensor are carried out according to relevant procedures per model and revision numbers.

In the next step the 2D-IR-TRACC assembly is mounted on the verification fixture in the accurately defined position 0 to obtain the 'Zero-Position Intercept' and the 'Offset Angle'.

Step three in position 1 and 2 on the fixture checks the polarity of the angle sensor and verifies if the calculated x- and y- co-ordinates, angle and radius correspond to the actual positions on the fixture. This last step confirms that the verification has been executed correctly. In case of a non-correspondence all previous steps need to be re-examined and corrected until the results correspond to the expected values.

(Con't)

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## Implementation

The procedure was implemented in production September 2015.

Scope: 2D-IR-TRACC models IF-367 and IF-368 for WorldSID 50M; IF-371 for WorldSID 5th Female; IF-372 for Q10.

Equipment: 2D IR-TRACC Verification Fixture Kit, part TH-4000-2D.

## Documentation

2D IR-TRACC Zero-position Verification Procedure and Template included in TH-4000-2D kit.

The WorldSID 50M and Q10 User Manuals provide details and instructions on implementation of the calibration parameters in the data acquisition system, formulae to obtain results in the dummy spine co-ordinate system, ISO MME codes and how to check sensor polarities.





Figure 1: The Zero-Position Verification Fixture

<http://www.humaneticsatd.com/system/files/limited/UM-WorldSID-50th.pdf>

<http://www.humaneticsatd.com/system/files/limited/010-9900%20Q10%20User%20Manual.pdf>

As the WorldSID 5F dummy is currently under development an updated manual will be made available at a later date.

Euro NCAP TB21: <http://www.euroncap.com/en/for-engineers/>

Procedure	Fixture	Purpose	Documentation	Service Bulletin
 <b>Displacement Calibration</b>	Fixture TE-3700-IRKIT (or previous model TE-3600)	IR-TRACCs with <b>R4 and R5 revision</b> All models: 1D, 2D, 3D	IR-TRACC <b>Tubes In-Out (TIO)</b> Calibration Template and Written Procedure Part #11428	IR-TRACC Tubes In-Out Calibration October 2015
		IR-TRACCs <b>up to R3 revision</b> All models: 1D, 2D, 3D	IR-TRACC <b>Harmonized</b> Calibration Template and Written Procedure Part #11427	IR-TRACC Harmonized February 2014
 <b>Zero-Position Verification</b>	TH-4000-2D	<b>2D IR-TRACC</b> assembly verification for WorldSID 50 and 5th and Q10	2D IR-TRACC <b>Zero-Position</b> Verification Template and Written Procedure	2D IR-TRACC Zero-Position Verification October 2015
<b>IR-TRACC Absolute Length and Angle Calibration</b>		Obsolete/ replace by zero-position verification	-	IR-TRACC Absolute Length October 2014

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## Recalibration Options R1, R2, R3

Part Number		Single					Tubes in-out IR-TRACC calibration	Harmonised IR-TRACC calibration	Y-axis angle calibration	Z-axis angle calibration	Zero-position 2D or 3D
1	RECAL-INST-1X	Up to R3 IR-TRACCs* - Single						●			
2	RECAL-INST-1X (H+TIO)†	Up to R3 IR-TRACC*- Single including R4-R5 Tubes In-Out (TIO) Calibration Method					●	●			
		2D									
1	RECAL-2DR1- R3 (H)	Up to R3 IR-TRACCs* in 2D Assembly						●	●		●
2	RECAL-2DR1- R3 (H+TIO)	Up to R3 IR-TRACCs* in 2D Assembly including R4-R5 Tube In-Out (TIO) Calibration Method					●	●	●		●
		3D									
1	RECAL-3DR1- R3 (H)	Up to R3 IR-TRACCs* in 3D Assembly						●	●	●	●
2	RECAL-3DR1- R3 (H+TIO)	Up to R3 IR-TRACCs* in a 3D Assembly including R4-R5 Tube In-Out (TIO) Calibration Method					●	●	●	●	●

\* without "R4" or R5" in the model number † non-A2LA Accredited

## Recalibration Options R4 & R5

Part Number		Tubes in-out IR-TRACC calibration	Harmonised IR-TRACC calibration	Y-axis angle calibration	Z-axis angle calibration	Zero-position 2D or 3D
1	RECAL-INST-1X- IRTRACC	●				
2	RECAL-2DR4/ R5 (TIO)	●		●		●
3	RECAL-3DR4/ R5 (TIO)	●		●	●	●