

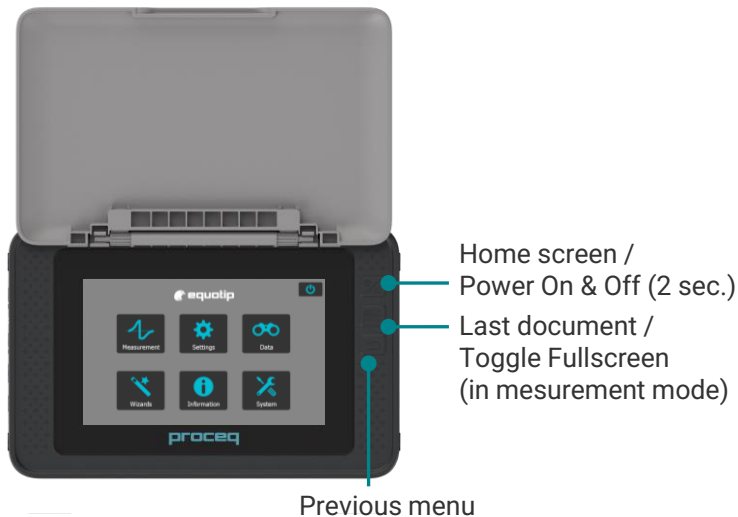


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## Conversion Curve - Technical Note

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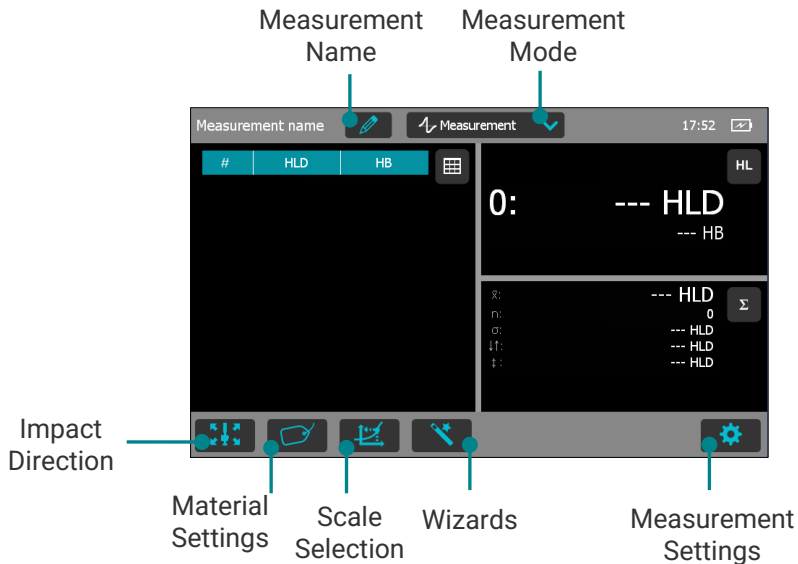
# Buttons



## NOTE

Leeb D and Leeb DC probes only!

# Measurement Screen



## NOTE

Leeb D and Leeb DC probes only!

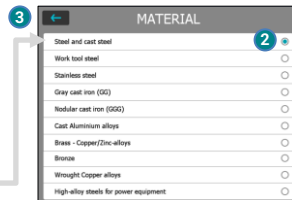
# Conversion Unit & Material Selection

## Leeb Probes

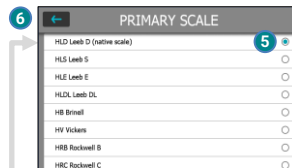
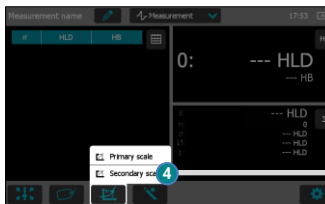


Method 1

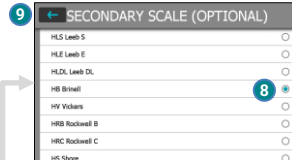
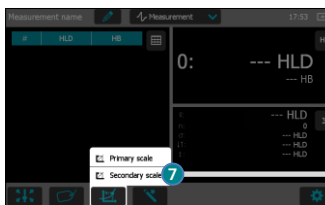
### Set Material



### Set Primary Scale



### Set Secondary Scale

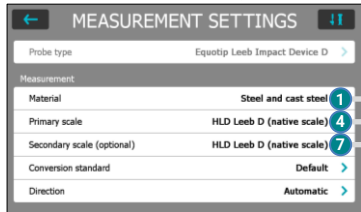
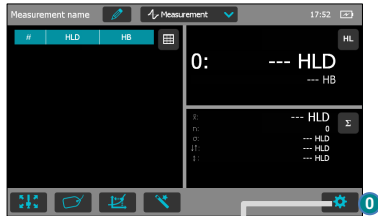


# Conversion Unit & Material Selection

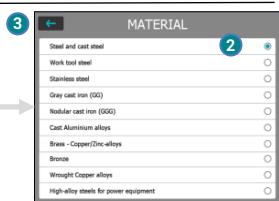
## Leeb Probes



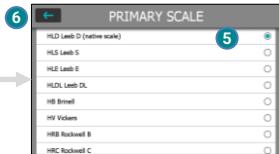
Method 2



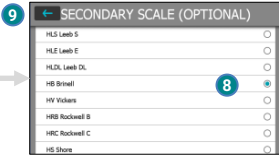
**Set Material**



**Set Primary Scale**



**Set Secondary Scale**



# Conversion Range - Datasheet

## Leeb probes



Material Class	Method	Unit	Leeb Probes					
			C	D/DC	DL	S	E	G
Steel and Cast Steel	Vickers	HV	81-955	80-950	101-964	101-964	*	81-1012
	Brinell	HB	81-654	81-646	101-640	83-686	90-646	81-694
	Rockwell	HRB	38-100	37-100	*	*	48-100	*
		HRC	20-68	21-68	22-70	20-72	*	20-70
		HRA	*	*	61-88	61-88	*	*
	Shore	HS	30-99	31-97	28-104	29-103	*	30-102
	R <sub>m</sub> σ <sup>1a</sup>	MPa	275-2194	275-2297	340-2194	283-2195	305-2194	275-2194
	R <sub>m</sub> σ <sup>2b</sup>	MPa	616-1148	614-1485	615-1480	616-1480	618-1478	615-1479
	R <sub>m</sub> σ <sup>3c</sup>	MPa	449-847	449-847	450-846	450-846	450-847	450-846
Work Tool Steel	Vickers	HV	80-900	80-905	102-924	82-1009	*	98-942
	Rockwell	HRC	21-67	21-67	22-68	23-70	*	20-67
Stainless Steel	Vickers	HV	85-802	*	119-934	88-668	*	*
	Brinell	HB	85-655	*	105-656	87-661	*	*
	Rockwell	HRB	46-102	*	70-104	49-102	*	*
		HRC	20-62	*	21-64	20-64	*	*
Grey Cast Iron (GG) Lamellar Graphite	Brinell	HB	90-664	*	*	*	*	*
	Vickers	HV	90-698	*	*	*	92-326	*
	Rockwell	HRC	21-59	*	*	*	*	*
Nodular Cast Iron (GGG)	Brinell	HB	95-686	*	*	*	127-364	*
	Vickers	HV	96-724	*	*	*	*	*
	Rockwell	HRC	21-60	*	*	*	19-37	*
Cast Aluminum Alloys	Brinell	HB	19-164	20-187	20-184	23-176	19-168	21-167
	Vickers	HV	22-193	21-191	22-196	22-198	*	*
	Rockwell	HRB	24-85	*	*	*	24-86	23-85
Brass Copper/Zinc Alloys	Brinell	HB	40-173	*	*	*	*	*
	Rockwell	HRB	14-95	*	*	*	*	*
Bronze CuAl/CuSn Alloys	Brinell	HB	60-290	*	*	*	*	*
Wrought Copper Alloys	Brinell	HB	124	*	*	*	*	*

**NOTE** The conversions are valid in the indicated range and scale for the respective probes and materials.

\* No Conversion

σ<sup>1a</sup> - Tensile strength for unalloyed or low-alloy steel

σ<sup>2b</sup> - Tensile strength of quenching and tempering steels in the quenched tempered conditions

σ<sup>3c</sup> - Tensile strength of quenching and tempering steels in the untreated, soft annealed or normalized conditions

# Conversion Unit & Material Selection

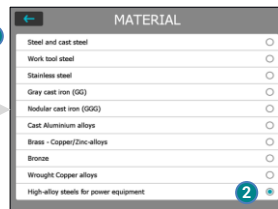
## Leeb Probes on High-Alloy Steels (DL/T 1845)

### Set Material

Choose High-Alloy Steels for Power Equipment as Material Group

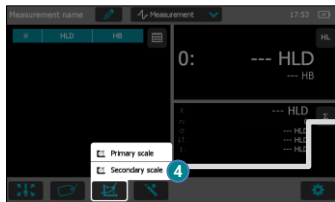


3

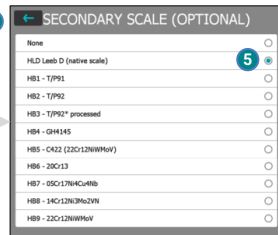


### Set Secondary Scale

Choose Material HB1-HB9 as Secondary Scale to be Displayed in HBW Hardness Unit.



6



### NOTE

Leeb D and Leeb DC probes only!

# Conversion Range – Datasheet

## Leeb Probes on High-Alloy Steels (DL/T 1845)

← SECONDARY SCALE (OPTIONAL)

None	<input type="radio"/>
HLD Leeb D (native scale)	<input checked="" type="radio"/>
HB1 - T/P91	<input type="radio"/>
HB2 - T/P92	<input type="radio"/>
HB3 - T/P92* processed	<input type="radio"/>
HB4 - GH4145	<input type="radio"/>
HB5 - C422 (22Cr12NiWMoV)	<input type="radio"/>
HB6 - 20Cr13	<input type="radio"/>
HB7 - 05Cr17Ni4Cu4Nb	<input type="radio"/>
HB8 - 14Cr12Ni3Mo2VN	<input type="radio"/>
HB9 - 22Cr12NiWMoV	<input type="radio"/>

Material Class	Method	Unit	Leeb Probes
			D/DC
High-alloy steels			
P/T91(10Cr9Mo1VNbN)			130-300
P/T92 (10Cr9moW2VNbBN)			130-281
P/T92 welded			140-330
GV4145	Brinell	HBW	280-390
C422 (22Cr12NiWMoV)			240-380
20Cr13			280-310
05Cr17Ni4Cu4Nb			265-333
14Cr12NiBmo2VN			280-403
22CR12NiWMoV			256-320

### NOTE

Leeb D and Leeb DC probes only!



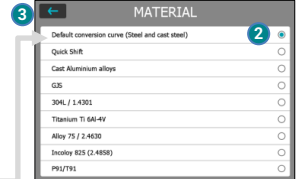
# Conversion Unit & Material Selection

## UCI

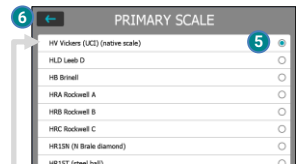
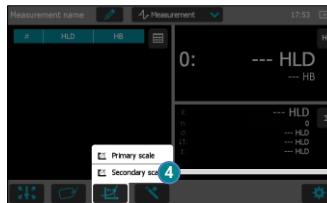
Method 1



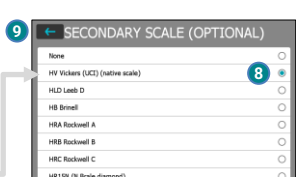
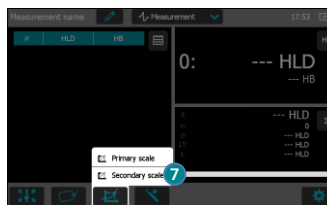
### Set Material



### Set Primary Scale



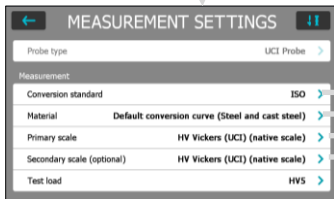
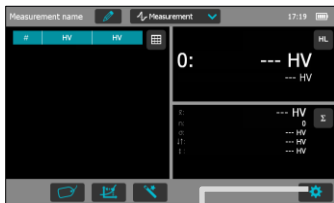
### Set Secondary Scale



# Conversion Unit & Material Selection

## UCI

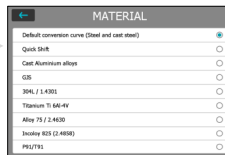
Method 2



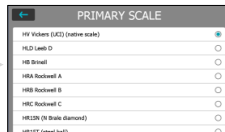
Set Standard



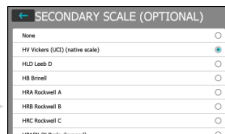
Set Material



Set Primary Scale



Set Secondary Scale



# Conversion Range Datasheet

## UCI

**MATERIAL**

Default conversion curve (Steel and cast steel)

Quick Shift

Cast Aluminium alloys

GJS

304L / 1.4301

Titanium Ti 6Al-4V

Alloy 75 / 2.4630

Incoloy 825 (2.4858)

P91/T91

Material Class	Method	Unit	UCI Probes	
			Conversion Range	E Modulus GPa
<b>Steel and cast Steel</b>	Leeb	HLD	290 - 890	
	Brinell	HB	66 - 737	
	Rockwell	HRC	37 - 85	
		HRA	59 - 99	
		HRB	20 - 70	210
		HR15N	69 - 94	
		HR15T	78 - 96	
	R <sub>m</sub>	MPa	220 - 2264	
<b>Aluminium</b>	Vickers	HV	30-200	75
<b>1-point quick-shift conversion curves:</b>				
<b>Titanium Ti 6Al-4V</b>		HV	263-406*	115
<b>Cast Iron</b>	Vickers	HV	141-193*	160
<b>Incoloy 825 / 2.4858</b>		HV	32-197*	195
<b>304L/1.4307</b>		HV	170-244*	200
<b>P91/T91</b>		HV	140-228*	218
<b>Alloy 75/2.4630</b>		HV	140-225*	221

### NOTE

\* Recommended conversion range base on 1-point quick shift conversions.

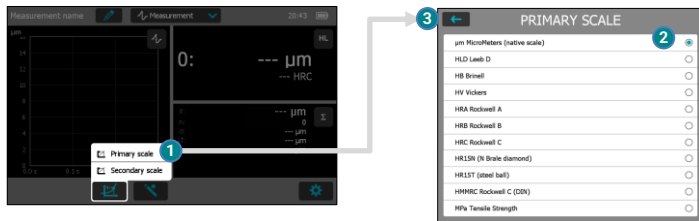
Measurements outside of this range may be prone to higher measurement errors.

# Conversion Unit & Material Selection

## Portable Rockwell

Method 1

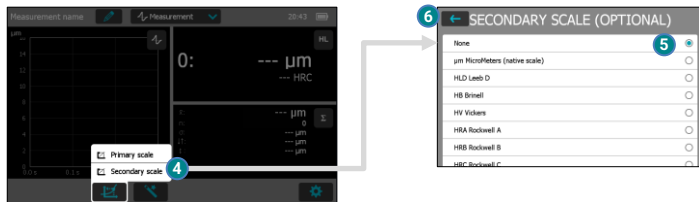
### Set Primary Scale



The screenshot shows the 'PRIMARY SCALE' selection screen. A callout box labeled '1' points to the 'Primary scale' and 'Secondary scale' options in the bottom right of the main interface. A callout box labeled '2' points to the 'μm MicroMeters (native scale)' option in the list. A callout box labeled '3' points to the top of the list.

Scale	Selection
μm MicroMeters (native scale)	<input checked="" type="radio"/>
HLD Leeb D	<input type="radio"/>
HB Brinell	<input type="radio"/>
HV Vickers	<input type="radio"/>
HRA Rockwell A	<input type="radio"/>
HRB Rockwell B	<input type="radio"/>
HRC Rockwell C	<input type="radio"/>
HR15N (N Brinell diamond)	<input type="radio"/>
HR15T (steel ball)	<input type="radio"/>
HMHC Rockwell C (DD)	<input type="radio"/>
MPa Tensile Strength	<input type="radio"/>

### Set Secondary Scale



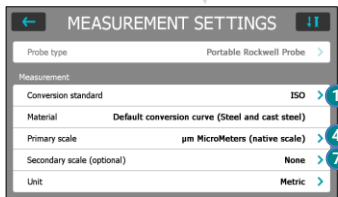
The screenshot shows the 'SECONDARY SCALE (OPTIONAL)' selection screen. A callout box labeled '4' points to the 'Secondary scale' option in the bottom right of the main interface. A callout box labeled '5' points to the 'μm MicroMeters (native scale)' option in the list. A callout box labeled '6' points to the top of the list.

Scale	Selection
None	<input checked="" type="radio"/>
μm MicroMeters (native scale)	<input type="radio"/>
HLD Leeb D	<input type="radio"/>
HB Brinell	<input type="radio"/>
HV Vickers	<input type="radio"/>
HRA Rockwell A	<input type="radio"/>
HRB Rockwell B	<input type="radio"/>
HRC Rockwell C	<input type="radio"/>

# Conversion Unit & Material Selection

## Portable Rockwell

Method 2



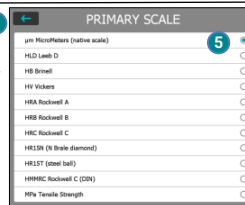
Set Standard

3



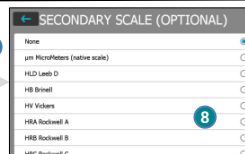
Set Primary Scale

6



Set Secondary Scale

9



# Conversion Range Datasheet

## Portable Rockwell




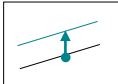
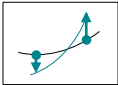

←
PRIMARY SCALE

- µm MicroMeters (native scale) ●
- HLD Leeb D ○
- HB Brinell ○
- HV Vickers ○
- HRA Rockwell A ○
- HRB Rockwell B ○
- HRC Rockwell C ○
- HR15N (N Brale diamond) ○
- HR15T (steel ball) ○
- HMMRC Rockwell C (DIN) ○
- MPa Tensile Strength ○

Material Class	Method	Unit	Portable Rockwell Conversion Range
<b>Steel and cast Steel</b>	Leeb	HLD	290-890
	Vickers	HV	30-1080
	Brinell	HB	76-618
		HRA	37-87
	Rockwell	HRB	55-100
		HRC	19-70
	HR15N		69-93
	HMMRC	19-70	
	Rm Nmm <sup>2</sup>	MPa	255-2180

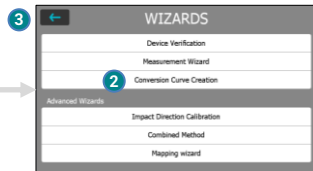
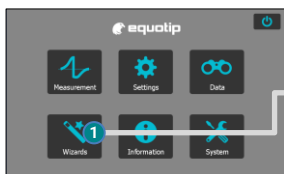
# User-Defined Conversion Curves

## Curve Types

Type	Function		METHOD
<b>One Point</b>	<b>Offset of the existing conversion</b> Shifts the existing conversion to user-defined hardness value		LEEB, ROCKWELL, UCI
<b>One Point</b>	<b>Import quick shift value (UCI only)</b> Shifts the value in Vickers HV(UCI) to a new user-defined defined hardness value according to ASTM E140 and ISO 18265 standard		UCI
<b>Two Points</b>	<b>Rotation of existing conversion</b> Rotates the existing conversion curve with two user-defined hardness values		LEEB, ROCKWELL, UCI
<b>Two Points</b>	<b>Definition of curve through coefficients</b> Generates entire conversion curve from a polynomial equation by typing-in the equation coefficients		LEEB, ROCKWELL, UCI

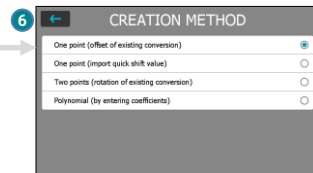
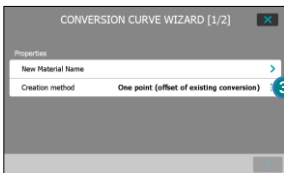
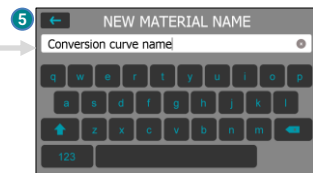
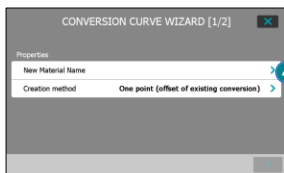
# User-Defined Custom Conversion Conversion Curve Type Selection

## Start Wizard



## Create Method

Type in the Name of Conversion Curve/Material

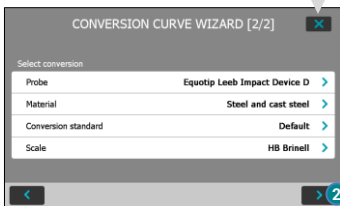
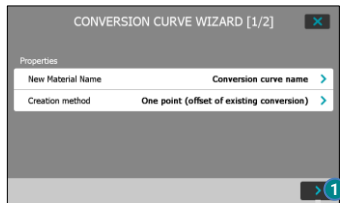




# User-Defined Conversion Curves

## One Point

Offset of Existing Conversion



### Select point

Select one-point correction point



### Enter values

Enter values from the measured reference sample



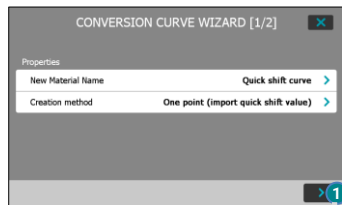
### Save conversion



# User-Defined Conversion Curves

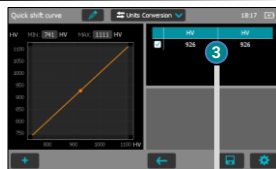
## One Point

Import Quick Shift Value



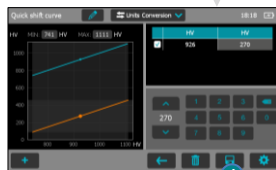
### Select point

Select one-point correction point



### Enter values

Enter values from the measured reference sample



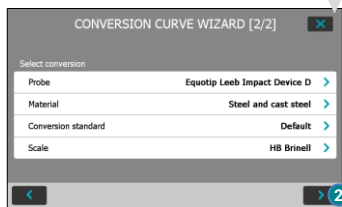
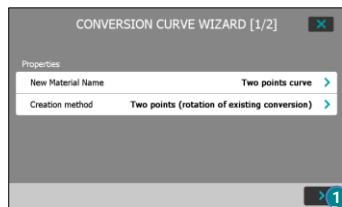
### Save conversion



# User-Defined Conversion Curves

## Two Point Curve

Rotation of Existing Conversion



### Select point

Select first/second correction point



### Enter values

Enter values for the first/second point from the measured reference samples

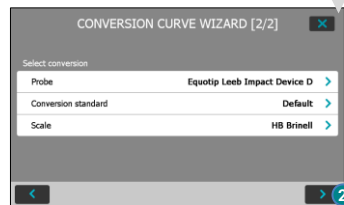
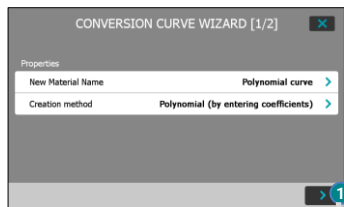


### Save conversion



# Conversion Curves: Polynomial

Definition of Curve by Entering Coefficients



## Select point

Select the polynomial equation coefficients:  $A_0, A_1 \dots A_5$



## Enter values

Enter the polynomial equation coefficients:  $A_0, A_1 \dots A_5$



## Save conversion



## Equation Format

$ScaleB(HLD) = A_0 + A_1 \cdot HLD_1 + A_2 \cdot HLD_2 + A_3 \cdot HLD_3 + A_4 \cdot HLD_4 + A_5 \cdot HLD_5$

## Example

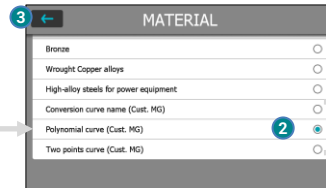
$HB(HLD) = -2.7862E+02 - 2.3014E+00(HLD)^1 + 7.8978E-03(HLD)^2 - 9.5946E-06(HLD)^3 + 5.0641E-09(HLD)^4 + 0.00(HLD)^5$

# Using the Custom Conversion Curves

## Example: Polynomial Curve HB(HLD)

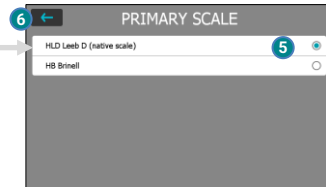
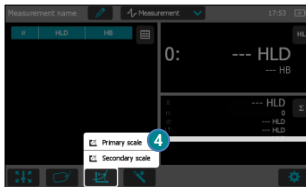
### Set Material

User-defined conversion curves:  
e.g. Polynomial curve (Cust. MG)

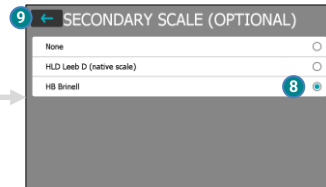
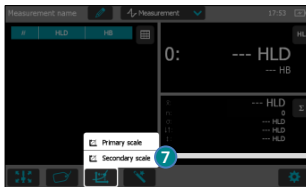


Custom  
Material Groups

### Set Primary Scale



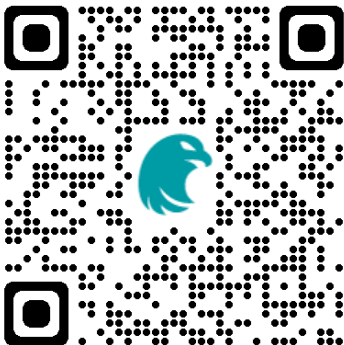
### Set Secondary Scale



SWISS  MADE

For more information on the use of the product,  
please refer to product documentation.

It is available for download on



<https://www.screeningeagle.com/en/products/category/metal/equotip>

**For safety and liability information, please download at <https://www.screeningeagle.com/en/about-us/gtc-and-certificates>**  
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