

# PENKO Engineering B.V.

Your Partner for Fully Engineered Factory Solutions

# OMRON

Protocol description:  
PENKO Omron Fins



**PENKO**

*an ETC Company*

# PENKO Omron Fins protocol

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# PENKO Omron Fins protocol

## Introduction

The PENKO Fins protocol supports the following features:

- Read weigher data and control weighers
- Read inputs and outputs
- Read/write markers
- Read/write registers and levels

The PENKO Fins implementation is only available for Ethernet connection.



# PENKO Omron Fins protocol

## 1 Basics

The PENKO devices that support the protocol and the used data types.

### 1.1 Devices

The following PENKO devices support the Fins protocol:

Device Series
<b>SGM7xx SGM8xx</b>
<b>1020</b>
<b>Flex 2100</b>
<b>Flex</b>
<b>Flex Multichannel</b>

Flex multichannel supports Weigher 1, 2, 3 and 4. All other instruments only support Weigher 1.

### 1.2 Data types

Data type	Description
Float	Double Word floating point IEEE 754, 4 bytes
Long	Double Word signed, 4 bytes
Word	Unsigned Word, 2 bytes



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## 2 Memory locations

The following memory locations are used:

### 2.1 Inputs, outputs and markers

Memory location	Inputs/Outputs/Markers	Data type	Address area	PLC/SCADA
0 - 11	Inputs 1 - 192	Word	HR=B2	H0000 to H0011
12	Inputs 193 - 200 (low byte) Outputs 201 - 208 (high byte)	Word	HR=B2	H0012
13 - 24	Outputs 209 - 400	Word	HR=B2	H0013 to H0024
25 - 62	Markers 401 - 1000	Word	HR=B2	H0025 to H0062

### 2.2 Indicators and registers

Memory location	Indicators/Registers	Data type	Address area	PLC/SCADA
0 - 198	Indicators 1 - 100	Float	DM=82	D00000 to D00198
200 - 1998*	Registers 1 - 900	Long**	DM=82	D00200 to D01998

\* Indicator versions use register 1 - 4 for level/setpoint values

\*\* The Flex series support the use of floating point registers starting at a configurable position. The SGM and 1020 support floating point registers above 100.

### 2.3 Weigher data

Memory location	Weigher data	Data type	Address area	PLC/SCADA
0 - 98	Weigher 1 - 50	Float	WR=B1	W000 to W098
100 - 198	Weigher 1 - 50	Long	WR=B1	W100 to W198
16*	Weigher format	Word	WR=B1	W016
17*	Weigher status	Word	WR=B1	W017
0*	Weigher control	Word	WR=B1	W000

\*For the Flex Multichannel an offset of 20, 40 and 60 applies for weigher 2, 3 and 4



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## 3 Weigher values

### 3.1 Weigher data

Weigher values are available as float and long values.

Address offset	Weigher data	Name	Description	PLC/SCADA	
				Float	Long
0	1	WEIGHT	multi range net weigher value	W000	W100
2	1	FAST GROSS	unfiltered gross weigher value	W002	W102
4	1	FAST NET	unfiltered net weigher value	W004	W104
6	1	TARE	tare value	W006	W106
8	1	WEIGHTx10	multi range net weigher value shown with extra decimal	W008	W108
10	1	FAST GROSSx10	unfiltered gross weigher value shown with extra decimal	W010	W110
12	1	FAST NETx10	unfiltered net weigher value shown with extra decimal	W012	W112
14	1	TAREx10	tare value shown with extra decimal	W014	W114
16	1	Weigher format	Weigher 1 format, WORD, W016		
17	1	Weigher status	Weigher 1 status, WORD, W017		
20	2	WEIGHT	multi range net weigher value	W020	W120
22	2	FAST GROSS	unfiltered gross weigher value	W022	W122
24	2	FAST NET	unfiltered net weigher value	W024	W124
26	2	TARE	tare value	W026	W126
28	2	WEIGHTx10	multi range net weigher value shown with extra decimal	W028	W128
30	2	FAST GROSSx10	unfiltered gross weigher value shown with extra decimal	W030	W130
32	2	FAST NETx10	unfiltered net weigher value shown with extra decimal	W032	W132
34	2	TAREx10	tare value shown with extra decimal	W034	W134
36	2	Weigher format	Weigher 2 format, WORD, W036		
37	2	Weigher status	Weigher 2 status, WORD W037		
40	3	WEIGHT	multi range net weigher value	W040	W140
42	3	FAST GROSS	unfiltered gross weigher value	W042	W142
44	3	FAST NET	unfiltered net weigher value	W044	W144
46	3	TARE	tare value	W046	W146
48	3	WEIGHTx10	multi range net weigher value shown with extra decimal	W048	W148
50	3	FAST GROSSx10	unfiltered gross weigher value shown with extra decimal	W050	W150
52	3	FAST NETx10	unfiltered net weigher value shown with extra decimal	W052	W152
54	3	TAREx10	tare value shown with extra decimal	W054	W154
56	3	Weigher format	Weigher 3 format, WORD, W056		
57	3	Weigher status	Weigher 3 status, WORD, W057		
60	4	WEIGHT	multi range net weigher value	W060	W160
62	4	FAST GROSS	unfiltered gross weigher value	W062	W162
64	4	FAST NET	unfiltered net weigher value	W064	W164
66	4	TARE	tare value	W066	W166
68	4	WEIGHTx10	multi range net weigher value shown with extra decimal	W068	W168
70	4	FAST GROSSx10	unfiltered gross weigher value shown with extra decimal	W070	W170
72	4	FAST NETx10	unfiltered net weigher value shown with extra decimal	W072	W172
74	4	TAREx10	tare value shown with extra decimal	W074	W174
76	4	Weigher format	Weigher 4 format, WORD, W076		
77	4	Weigher status	Weigher 4 status, WORD, W077		

**\*Weigher data 2, 3 and 4 are only available in the Flex Multichannel**



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The 1020 FMD has different data:

Address offset	Name	Description	PLC/SCADA	
			Float	Long
0	TRACKING	filtered tracking value	W000	W100
2	FAST TRACKING	unfiltered tracking value	W002	W102
4	HOLD	hold value - stored with zero button in hold mode, or with hold input	W004	W104
6	T.I.R.	total Indicated Readout value - the difference between the peak hold and valley hold value	W006	W106
8	PEAK	highest reached weigher value	W008	W108
10	VALLEY	lowest reached weigher value	W010	W110
12	TRACKING x10	tracking shown with extra decimal	W012	W112
14	FAST TRACKING x10	fast tracking shown with extra decimal	W014	W114
16	HOLDx10	hold shown with extra decimal	W016	W116
18	T.I.R.x10	T.I.R. shown with extra decimal	W018	W118
20	PEAKx10	peak shown with extra decimal	W020	W120
22	VALLEYx10	valley shown with extra decimal	W022	W122
24	Weigher format	Weigher 1 format, WORD, W016	W024	
25	Weigher status	Weigher 1 status, WORD, W017	W025	



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## 3.2 Weigher format

Weigher format is a word.

Bit #	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Definition
	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Signed
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Unsigned
	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Zero suppressing
	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No zero suppressing
	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	Step size 1
	-	-	-	-	0	0	0	1	-	-	-	-	-	-	-	-	Step size 2
	-	-	-	-	0	0	1	0	-	-	-	-	-	-	-	-	Step size 5
	-	-	-	-	0	0	1	1	-	-	-	-	-	-	-	-	Step size 10
	-	-	-	-	0	1	0	0	-	-	-	-	-	-	-	-	Step size 20
	-	-	-	-	0	1	0	1	-	-	-	-	-	-	-	-	Step size 50
	-	-	-	-	0	1	1	0	-	-	-	-	-	-	-	-	Step size 100
	-	-	-	-	0	1	1	1	-	-	-	-	-	-	-	-	Step size 200
	-	-	-	-	1	0	0	0	-	-	-	-	-	-	-	-	Step size 500
	-	-	-	-	1	0	0	1	-	-	-	-	-	-	-	-	Step size 1000
	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	Step size 2000
	-	-	-	-	1	0	1	1	-	-	-	-	-	-	-	-	Step size 5000
	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	No decimal point
	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	1	Decimal position 1
	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	0	Decimal position 2
	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	1	Decimal position 3
	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0	Decimal position 4
	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	Decimal position 5
	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0	Decimal position 6
	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	Reserved





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## 3.3 Weigher status

Weigher status is a word.

Bit #	Called	Definition
0	OVERLOAD	Hardware overload/underload detected on loadcell
1	MAXLOAD	Overload detected on loadcell
2	STABLE	Weigher signal is stable
3	STABLE RANGE	Weigher signal is in stable range
4	ZERO SET	Weigher zero is corrected
5	ZERO CENTER	Weigher in center of zero range
6	ZERO RANGE	Weigher is in zero range, zero is possible
7	ZERO TRACK	Weigher signal is in zero tracking range, zero tracking is possible
8	TARE	Weigher tare is active
9	PTARE	Weigher preset tare is active
10	SAMPLE	Used by internal process handling
11	BAD CAL	Calibration is bad, invalid, not available
12	CAL ENABLED	Calibration is enabled, used by internal process handling
13	INDUSTRIAL	If set weigher runs in industrial mode, if reset weigher runs certified operation mode
14	NOT LEVEL	Weigher system in blocking, warming up or scale is not level
15	RESERVED	Reserved mode always 0



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## 3.4 Weigher control

Weigher control is a word and is write-only.

Address offset	Weigher data	Name	Description	PLC/SCADA Word
0	1	Control	See table below	W000
20	2	Control	See table below	W020
40	3	Control	See table below	W040
60	4	Control	See table below	W060

Bit #	Called	Definition
0	ZERO_RESET*	Reset the actual zero weight, condition only possible in noncertified mode
1	ZERO_SET*	Activate new zero weight, condition stable signal
2	TARE_OFF*	Switch actual tare weight off
3	TARE_ON*	Activate new tare weight, condition stable signal
4	TARE_TOGGLE*	Toggle the Tare weight on condition stable signal, off condition none
5-16	RESERVED	Reserved bits always 0

***\*Action on rising edge of bit***

**The 1020 FMD has different control bits:**

Bit #	Called	Definition
0	ZERO_RESET*	Reset the actual zero force
1	ZERO_SET*	Activate new zero force, condition stable signal
2	PEAK_RESET*	Reset peak hold value
3	VALLEY_RESET*	Reset valley hold value
4	HOLD_RESET*	Reset hold value
5	TIR_RESET*	Reset T.I.R. value
6-16	RESERVED	Reserved bits always 0

***\*Action on rising edge of bit***



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## 4 Inputs, outputs and Markers

Address offset	Access	Name	Data type	Description
0	Read	Inputs 1 - 16	Word	General purpose inputs, not all inputs have physical connections
1	Read	Inputs 17 - 32	Word	
2	Read	Inputs 33 - 48	Word	
3	Read	Inputs 49 - 64	Word	
4	Read	Inputs 65 - 80	Word	
5	Read	Inputs 81 - 96	Word	
6	Read	Inputs 97 - 112	Word	
7	Read	Inputs 113 - 128	Word	
8	Read	Inputs 129 - 144	Word	
9	Read	Inputs 145 - 160	Word	
10	Read	Inputs 161 - 176	Word	
11	Read	Inputs 177 - 192	Word	
12	Read	Inputs 193 - 200 Outputs 201 - 208	Word	General purpose outputs, not all outputs have physical connections
13	Read	Outputs 209 - 224	Word	
14	Read	Outputs 225 - 240	Word	
15	Read	Outputs 241 - 256	Word	
16	Read	Outputs 257 - 272	Word	
17	Read	Outputs 273 - 288	Word	
18	Read	Outputs 289 - 304	Word	
19	Read	Outputs 305 - 320	Word	
20	Read	Outputs 321 - 336	Word	
21	Read	Outputs 337 - 352	Word	
22	Read	Outputs 353 - 368	Word	
23	Read	Outputs 369 - 384	Word	
25	Read/Write	Marker 401 - 416	Word	General purpose markers
26	Read/Write	Marker 417 - 432	Word	
61	Read/Write	Marker 977 - 992	Word	
62	Read/Write	Marker 993 - 1000	Word	High byte is always 0



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## 5 Indicators and registers/levels

Address offset	Access	Name	Data type	Description
0	Read	Indicator 1	Float	General purpose indicators, maximum depends on instrument.
...		...		
198		Indicator 100		
200	Read/ Write	Register 1	Long	Output level 1 if indicator
202		Register 2		Output level 2 if indicator
204		Register 3		Output level 3 if indicator
206		Register4		Output level 4 if indicator
208		Register 5		General purpose if controller
...		...		...
398		Register 100		General purpose if controller



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## 6 Examples

The following examples show the use of the FINS commands using the KEPServerEX OPC Server.

### 6.1 Read inputs/outputs

#### Read the status of inputs 1 - 16:

The used format is H0000

Input # 1 to 16 = address H0000

Input # 17 to 32 = address H0001 etc.

Address: H0000

Data type: Word

Lowest bit (LSB) = input 1

Highest bit (MSB) = input 16

The screenshot shows the configuration window for a data source. The 'Identification' section includes a 'Name' field with 'Input 1-16', an 'Address' field with 'H0000', and a 'Description' field with 'Read input 1 to 16'. The 'Data properties' section shows 'Data type' set to 'Word', 'Client access' set to 'Read Only', and 'Scan rate' set to '100 milliseconds'. Navigation buttons are visible on the right side.

#### Read the status of outputs 1 - 8:

The used format is H0000

Output # 1 to 8 = address H0012 (high byte)

Output # 9 to 24 = address H0013 etc.

Address: H0012

Data type: Word

Lowest bit (LSB) of high byte = output 1

Highest bit (MSB) of high byte = output 8

The screenshot shows the configuration window for a data source. The 'Identification' section includes a 'Name' field with 'Input 193-200 / Output 1-8', an 'Address' field with 'H0012', and a 'Description' field with 'Read output 1 to 8'. The 'Data properties' section shows 'Data type' set to 'Word', 'Client access' set to 'Read Only', and 'Scan rate' set to '100 milliseconds'. Navigation buttons are visible on the right side.



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## 6.2 Read/write markers

### Read/write marker 1 - 16:

The used format is H0000

Marker # 1 to 16 = address H0025

Marker # 17 to 32 = address H0026 etc.

Address: H0025

Data type: Word

Lowest bit (LSB) = input 1

Highest bit (MSB) = input 16

The screenshot shows a configuration window for a marker. It is divided into two main sections: 'Identification' and 'Data properties'.  
In the 'Identification' section, there are three input fields: 'Name' with the value 'Marker 1-16', 'Address' with the value 'H0025', and 'Description' with the value 'Read marker 1 to 16'. To the right of these fields are several control icons, including left and right arrows, a search icon, a refresh icon, and a close icon.  
In the 'Data properties' section, there are three dropdown menus: 'Data type' set to 'Word', 'Client access' set to 'Read/Write', and 'Scan rate' set to '100 milliseconds'.

### Read/write marker 993 - 1000:

The used format is H0000

Marker # 593 to 600 = address H0012  
(low byte)

Address: H0062

Data type: Word

Lowest bit (LSB) of low byte = marker 593

Highest bit (MSB) of low byte = marker  
600

The screenshot shows a configuration window for a marker. It is divided into two main sections: 'Identification' and 'Data properties'.  
In the 'Identification' section, there are three input fields: 'Name' with the value 'Marker 593-600', 'Address' with the value 'H0062', and 'Description' with the value 'Read marker 593 to 600'. To the right of these fields are several control icons, including left and right arrows, a search icon, a refresh icon, and a close icon.  
In the 'Data properties' section, there are three dropdown menus: 'Data type' set to 'Word', 'Client access' set to 'Read/Write', and 'Scan rate' set to '100 milliseconds'.



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## 6.3 Read weigher values

### Read weigher 1 as Float:

The used format is W000

Weigher # 1 = address W000  
Weigher # 2 = address W002 etc.

Address: W000  
Data type: Float

The screenshot shows a configuration window with two main sections: 'Identification' and 'Data properties'. In the 'Identification' section, the 'Name' field is 'Weigher weight', the 'Address' is 'W000', and the 'Description' is 'Weigher weight float'. In the 'Data properties' section, the 'Data type' is set to 'Float', 'Client access' is 'Read Only', and the 'Scan rate' is '100 milliseconds'. There are also navigation buttons on the right side of the window.

### Read weigher 2 as Long:

The used format is W000

Weigher # 1 = address W100  
Weigher # 2 = address W102 etc.

Address: W102  
Data type: Long (signed 32bit)

The screenshot shows a configuration window with two main sections: 'Identification' and 'Data properties'. In the 'Identification' section, the 'Name' field is 'Weigher gross long', the 'Address' is 'W102', and the 'Description' is 'Weigher gross long'. In the 'Data properties' section, the 'Data type' is set to 'Long', 'Client access' is 'Read Only', and the 'Scan rate' is '100 milliseconds'. There are also navigation buttons on the right side of the window.



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## 6.4 Read/write indicators/registers

### Read indicator 1:

The used format is D00000

Indicator # 1 = address D00000  
Indicator # 2 = address D00202 etc.

Address: D00000  
Data type: Float

The screenshot shows a configuration window for 'Read indicator 1'. It is divided into two main sections: 'Identification' and 'Data properties'.  
In the 'Identification' section, the 'Name' field contains 'Indicator 1', the 'Address' field contains 'D00000', and the 'Description' field contains 'Read indicator 1'. There are several icons to the right of these fields, including a list icon, a help icon, a checkmark icon, and navigation arrows.  
In the 'Data properties' section, the 'Data type' is set to 'Float', the 'Client access' is set to 'Read Only', and the 'Scan rate' is set to '100 milliseconds'.

### Read/write extended register 2:

The used format is D00000

Register # 1 = address D00200  
Register # 2 = address D00202 etc.

Address: D00202  
Data type: Long (signed 32bit)

The screenshot shows a configuration window for 'Read/write extended register 2'. It is divided into two main sections: 'Identification' and 'Data properties'.  
In the 'Identification' section, the 'Name' field contains 'Extended register 2', the 'Address' field contains 'D00202', and the 'Description' field contains 'Read/write ext register 2'. There are several icons to the right of these fields, including a list icon, a help icon, a checkmark icon, and navigation arrows.  
In the 'Data properties' section, the 'Data type' is set to 'Long', the 'Client access' is set to 'Read/Write', and the 'Scan rate' is set to '100 milliseconds'.





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## 6.5 Weigher control

### Set zero:

The used format is W000

Reset zero = address W000 bit 0

Set zero = address W000 bit 1

**See page 4**

Address: W000

Data type: Word

Send: bit 1 = decimal value 2

Identification

Name: Weigher control

Address: W000

Description: Weigher control

Data properties

Data type: Word

Client access: Read/Write

Scan rate: 100 milliseconds

### Set tare:

The used format is W000

Reset tare = address W000 bit 2

Set tare = address W000 bit 3

**See page 4**

Address: W000

Data type: Word

Send: bit 3 = decimal value 8

Identification

Name: Weigher control

Address: W000

Description: Weigher control

Data properties

Data type: Word

Client access: Read/Write

Scan rate: 100 milliseconds



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## 6.6 Weigher format/status

### Read weigher format:

The used format is W000

Weigher format = address W016

Weigher status = address W017

**See page 4**

Address: W016

Data type: Word

The screenshot shows a configuration window for 'Weigher format'. It has two main sections: 'Identification' and 'Data properties'. In the 'Identification' section, the 'Name' is 'Weigher format', the 'Address' is 'W016', and the 'Description' is 'Read weigher format'. In the 'Data properties' section, the 'Data type' is 'Word', 'Client access' is 'Read Only', and the 'Scan rate' is '100 milliseconds'. There are navigation buttons on the right side of the window.

### Read weigher status:

The used format is W000

Weigher format = address W016

Weigher status = address W017

**See page 4**

Address: W017

Data type: Word

The screenshot shows a configuration window for 'Weigher status'. It has two main sections: 'Identification' and 'Data properties'. In the 'Identification' section, the 'Name' is 'Weigher status', the 'Address' is 'W017', and the 'Description' is 'Read weigher status'. In the 'Data properties' section, the 'Data type' is 'Word', 'Client access' is 'Read Only', and the 'Scan rate' is '100 milliseconds'. There are navigation buttons on the right side of the window.



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## 6.7 Tag list

This is an example of a tag list in the KEPServerEX OPC Server.

Tag Name	Address	Data Type	Scan Rate	Scaling
Indicator 1	D00000	Float	100	None
Indicator programmed	D00002	Float	100	None
Extended register 1	D00200	Long	100	None
Extended register 2	D00202	Long	100	None
Extended register 20	D00238	Long	100	None
Extended register 100	D00398	Long	100	None
Input 1-16	H0000	Word	100	None
Input 17-32	H0001	Word	100	None
Input 177-192	H0011	Word	100	None
Input 193-200 / Output 201-208	H0012	Word	100	None
Output 209-224	H0013	Word	100	None
Marker 1-16	H0025	Word	100	None
Weigher control	W000	Word	100	None
Weigher weight	W000	Float	100	None
Weigher gross	W002	Float	100	None
Weigher net	W004	Float	100	None
Weigher tare	W006	Float	100	None
Weigher weight x 10	W008	Float	100	None
Weigher gross x 10	W010	Float	100	None
Weigher net x 10	W012	Float	100	None
Weigher tare x 10	W014	Float	100	None
Weigher format	W016	Word	100	None
Weigher status	W017	Word	100	None
Weigher weight long	W100	Long	100	None
Weigher gross long	W102	Long	100	None





#### About PENKO

At PENKO Engineering we specialize in weighing. Weighing is inherently chemically correct, independent of consistency, type or temperature of the raw material. This means that weighing any kind of material guarantees consistency and thus, it is essential to sustainable revenue generation in any industry. As a well-established and proven solution provider, we strive for the ultimate satisfaction of custom design and/or standard applications, increasing your efficiencies and saving you time, saving you money.

Whether we are weighing raw materials, components in batching, ingredients for mixing or dosing processes, - or weighing of static containers and silos, or - in-motion weighing of railway wagons or trucks, by whatever means required during a process, we are essentially forming vital linkages between processes and businesses, anywhere at any time. We design, develop and manufacture state of the art technologically advanced systems in accordance with your strategy and vision. From the initial design brief, we take a fresh approach and a holistic view of every project, managing, supporting and/or implementing your system every step of the way. Curious to know how we do it? [www.penko.com](http://www.penko.com)

#### Certifications

PENKO sets high standards for its products and product performance which are tested, certified and approved by independent expert and government organizations to ensure they meet – and even – exceed metrology industry guidelines. A library of testing certificates is available for reference on: [http://penko.com/nl/publications\\_certificates.html](http://penko.com/nl/publications_certificates.html)

#### PENKO Professional Services

PENKO is committed to ensuring every system is installed, tested, programmed, commissioned and operational to client specifications. Our engineers, at our weighing center in Ede, Netherlands, as well as our distributors around the world, strive to solve most weighing-system issues within the same day. On a monthly basis PENKO offers free training classes to anyone interested in exploring modern, high-speed weighing instruments and solutions. Training sessions on request: [www.penko.com/training](http://www.penko.com/training)



#### PENKO Alliances

PENKO's worldwide network: Australia, Brazil, China, Denmark, Germany, Egypt, Finland, France, India, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Syria, Turkey, United Kingdom, South Africa, Slovakia Sweden and Switzerland, Singapore.

A complete overview you will find on: [www.penko.com/dealers](http://www.penko.com/dealers)

