Checkbox CHB

- Designed to meet the needs of industry

- Easy to use

- Sturdy construction and high functionality

- High reliability and checking performance

Checkbox CHB

Key features

Industrial design

- Compact integrated construction, protected against external light and maladjustment, IP54 protection class
- Flexible installation, thanks to a modular system concept

Easy to use

- Automatic Teach-in of new parts in seconds, no programming required
- Robust recognition algorithm based on part characteristics
- Up to 48 different parts can be saved to memory


TEACH
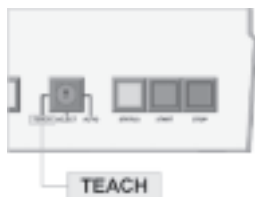
Sturdy construction and high functionality

- High conveying performance thanks to variable belt speed (standard: 300 mm/s)
- Maintenance-free system
- Sturdy pneumatic components: Integrated valves and flow controls
- Long service life thanks to brushless DC servo motor

High reliability and checking performance

- Simple, sturdy optics with high-quality industrial line-scan camera and LED light strip
- Insensitive to extraneous light, with contour detection via back-lighting method
- High resolution: 0.02 mm or 0.1 mm
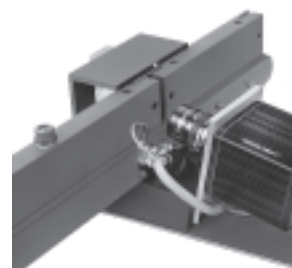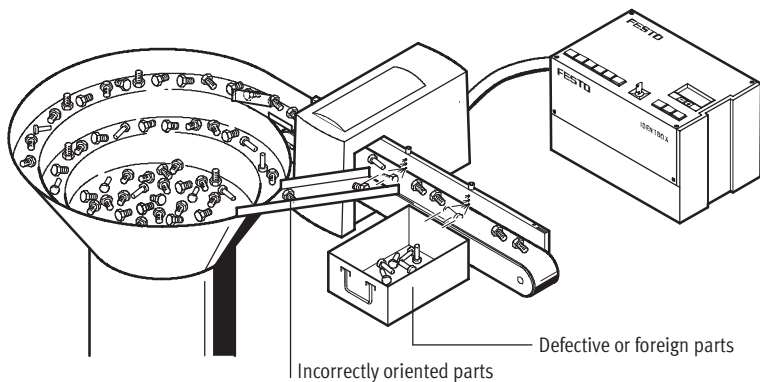
Checkbox CHB

Key features

FESTO

The Checkbox family CHB

The Checkbox is a system for the optical orientation detection and quality inspection of small parts. It consists of an optical unit, e.g. a conveying unit with integral camera and a control unit.
The part to be inspected is fed past the camera on the conveyor belt. The control unit analyses the contour of the part and distinguishes between good parts and those which are incorrectly oriented or defective and foreign parts.
All Checkbox units feature a Teach-in function which allows them to "learn" different parts automatically – without the need for programming. They are easy to use – the press of a button is all that is needed to change your feed system over from one part type to another.
The Checkbox is used wherever small parts need to be fed into assembly or machining units. This is where mechanical sorting devices reach their limits, especially where parts of complex shape or fast cycle times are involved. This calls for intelligent optical devices: The Checkbox family.

Incorrectly oriented parts

Defective or foreign parts

Identbox CHB-IB

The Identbox is the basic unit in the Checkbox family and is used to separate good parts, incorrectly-oriented parts and defective parts.

Countbox CHB-CB

The Countbox combines the features of the Identbox with a function for counting good parts with pre-selection of the desired quantity.

Sortbox CHB-SB

The Sortbox unites the functions of the Identbox and the Countbox in one unit and also conveys, sorts and compiles several different types of parts.

2008/06 – Subject to change

➜ Internet: www.festo.com/catalogue/...

3

Checkbox CHB

Key features

Which parts are suitable?

Here is a small selection of the many possibilities:

- Axes
- Bolts
- Brushes
- Buttons
- Ceramic seals
- Curtain hangers
- Drill bits
- Drills
- Fuses
- Game pieces
- Glass ampoules
- Inserts
- Insulating terminals
- Lever stoppers
- Link plates

- Lipstick casings
- Lock nuts
- Mouldings
- Mountings
- Needles
- O-rings
- Pen tops
- Plastic housings
- Plug connectors
- Screws
- Self-locking nuts
- Sensor housings
- Shafts
- Sleeves
- Small wares

- Sockets
- Spring washers
- Springs
- Stampings
- Switch contacts
- Tablets
- Threaded pins
- Toothbrush components
- Turned parts
- Wall plugs
- Washers
- Wooden dowels
- Zip-fastener components

Which industries use the Checkbox family?

- Metalworking industry
- Electrical engineering industry
- Woodworking industry
- Electroplating industry
- Injection moulding industry
- Packaging industry
- Pharmaceutical industry

- Cosmetics industry
- Jewellery industry
- Textile and clothing industry
- Assembly-systems industry
- Food industry
- Precision engineering industry

Checkbox CHB

Key features

FESTO

What does the camera see?

Part to be checked
Brass sleeve

Part to be checked
Valve spring

Part to be checked
Plug connector

Camera image
Brass sleeve

Camera image
Valve spring

Camera image
Plug connector

Part to be checked
Unmachined rod clevis

Part to be checked
Link plate

Part to be checked
Insulating terminal insert

Camera image
Unmachined rod clevis

Camera image
Link plate

Camera image
Insulating terminal insert

Checkbox CHB

Product range and peripherals overview

Possible combinations

Identbox CHB-IB	Countbox CHB-CB	Sortbox CHB-SB

Technical data ➔ 10
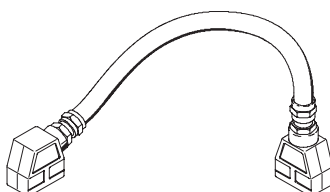

Technical data ➔ 10

Technical data ➔ 10

Connecting cable
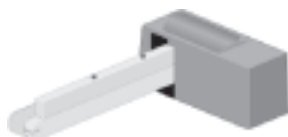**Control unit/conveying unit**

Cable lengths: 2 m
 3 m
 5 m

Conveying unit
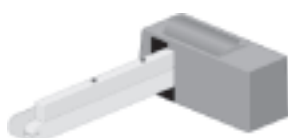
with reject positions and conveyor belt

Part ∅	0.5 ... 10 mm
Part length:	3 mm and above

Part ∅	3 ... 30 mm
Part length:	3 mm and above
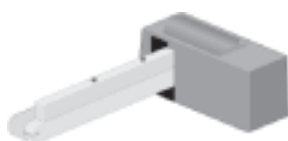
Part ∅	3 ... 80 mm
Part length:	5 mm and above

Tunnel version

without reject positions and conveyor belt

Part ∅	3 ... 30 mm
Part length:	3 mm and above

Part ∅	3 ... 80 mm
Part length:	5 mm and above

OEM version

without reject positions, conveyor belt and housing

Part ∅	3 ... 30 mm
	3 ... 80 mm
Part length:	3 mm and above

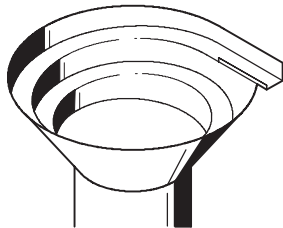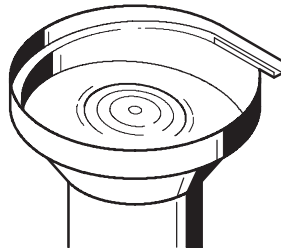| Product features	Identbox CHB-IB	Countbox CHB-CB	Sortbox CHB-SB
Performance characteristics			
Basic unit with full checking functionality	■	■	■
Up to 48 parts can be taught-in	■	■	■
Three feed paths: – Good parts › to the assembly station – Incorrectly oriented parts › back to the bowl feeder – Defective or foreign parts › to the reject bin	■	■	■
Automatic control of the bowl feeder	■	■	■
Monitoring of part buffer zones	■	■	■
Self-diagnosis	■	■	■
Can be remote-controlled	■	■	■

Integrated counting function:
– 1 ... 10 million parts can be pre-selected
  – When desired quantity is reached › signal to downstream machine
  – Upon acknowledgement › start of next cycle
– Continuous counting for production monitoring
		■	■

Simultaneous conveying of different part types and sorting into different buffer zones			■
Compiling of several parts			■
Sample applications			
Correctly oriented feeding at high cycle rates	■	■	■
Automatic rejection of defective or foreign parts	■	■	■
Quality inspection of turned and milled components for chips, burrs, etc.	■	■	■
Ejection of end pieces following automatic bar turning	■	■	■
Feeding of predetermined quantities of parts for packaging and compiling functions		■	■
Set feeding of small parts on to assembly pallets		■	■
Triggering of maintenance cycles		■	■
Feeding to several buffer zones from one bowl feeder (space saving)			■
Packaging terminal: Fully-automated control and monitoring of compiling procedures with several parts and different numbers of items			■
Sorting of mixed parts (e.g. after galvanising or grinding)			■

Feeding of parts

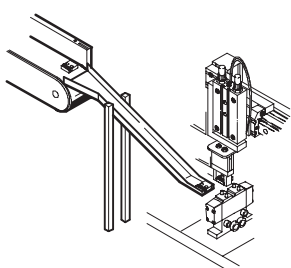| Vibratory bowl feeder | Centrifugal bowl feeder | Linear conveyor |
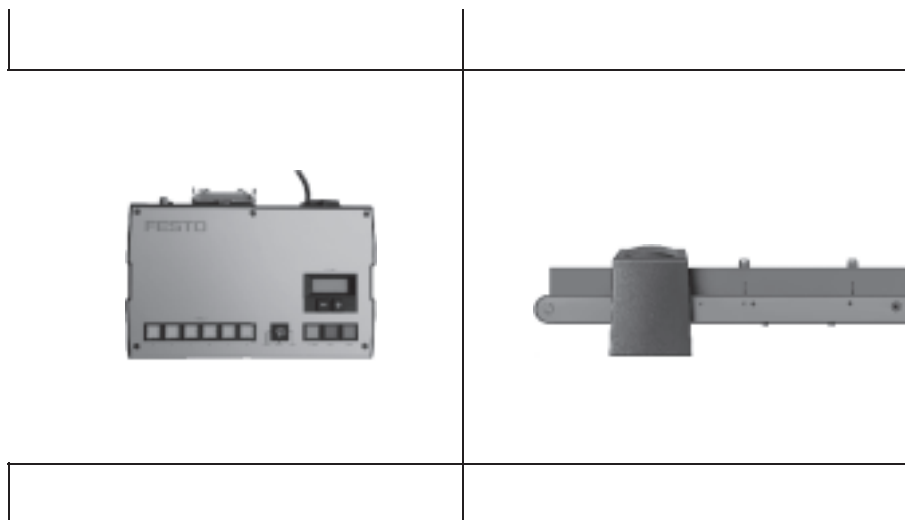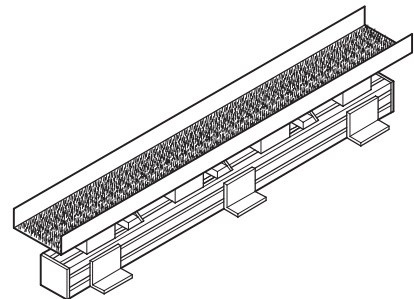
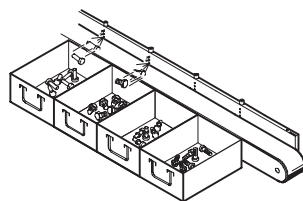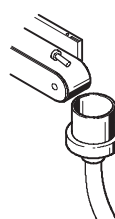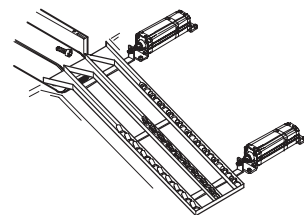**Transfer of parts**

| Slide into the processing centre | Chute | Downpipe | Triple buffer zone |

Checkbox CHB

Type code

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CHB – SB – F30 – L4P – K20 – D – EC – V33 – VA – BTA – UE – MP

Basic function	
CHB	Checkbox family

Control function	
IB	Identbox
CB	Countbox
SB	Sortbox

Component size	
F10	for ⌀ 0.5 … 10 mm
F30	for ⌀ 3 … 30 mm
F80	for ⌀ 3 … 80 mm

Transport function	
L2P	2 reject pos., belt transport dir.: to the left
R2P	2 reject pos., belt transport dir.: to the right
L4P	4 reject pos., belt transport dir.: to the left
R4P	4 reject pos., belt transport dir.: to the right
L6P	6 reject pos., belt transport dir.: to the left
R6P	6 reject pos., belt transport dir.: to the right
TU	without reject positions and conveyor belt
OEM	without reject positions, conveyor belt and housing

Connecting cable	
K20	2 m long
K30	3 m long
K50	5 m long

User manual	
D	German
E	English
F	French
S	Spanish
I	Italian

Additional function	
EC	Encoder

Field of view	
V10	Adjustment to 10 mm
V20	Adjustment to 20 mm
V33	Adjustment to 33 mm

Guiding bar material	
VA	Stainless steel

Alternative conveyor belts	
BTA	with longitudinal ridges
BTB	with longitudinal recesses
BTD	with smooth surface, made of silicone

Belt end	
UE	Guide roller unit with belt

Accessories	
MP	Mounting plates

Checkbox CHB

Technical data

Identbox
CHB-IB

Countbox
CHB-CB

Sortbox
CHB-SB

CHB-IB-…   CHB-CB-…/CHB-SB-…

General technical data				
For part sizes		∅ 10 mm	∅ 30 mm	∅ 80 mm
Component ∅		0.5 … 10	3 … 30	3 … 80
Component length	[mm]	3 and above	3 and above	5 and above
Component range		Rotationally symmetrical parts and pre-oriented parts of any shape		
Camera resolution	[mm]	0.02	0.1	
Exposure time	[µs]	72 … 8 192		136 … 8 192
Number of part memories		48		
Orientation		Max. 8 different orientations per part type		
Only with CHB-CB and CHB-SB				
Quantity pre-selection		Required quantities can be pre-selected separately for all stored parts		
Counting range		1 … 10 million per part type		

Electrical connection technology		
Operating voltage	[V AC]	85 … 264 (at 50/60 Hz), automatic detection
Max. power consumption	[VA]	100
Rated value for short-circuit protection	[A]	1, slow-blowing, safety circuit breaker integrated in mains switch

Operating and environmental conditions		
Operating medium		Filtered, unlubricated compressed air
Operating pressure	[bar]	0 … 6
Temperature range	[°C]	10 … 50 (non-condensing)
Protection class		IP54
Installation site		Dry, screened from extreme external light sources, cleanest possible ambient air

Checkbox CHB

Technical data

Interfaces			
PLC coupling outputs			The connection of an external power supply is recommended in order to achieve full electrical isolation. Load per output: < 100 mA, total load < 1 A
			Ready for operation
			Error output
			Feeder control
			Conveyor belt control
			Part acceptable and correctly oriented
			Part acceptable but incorrectly oriented
			Wrong part
	Additionally with	CHB-CB CHB-SB	Pre-selected counter reading reached
		CHB-SB	1 ... 6 (recognised type)
PLC coupling inputs			External type select
			External start
			Buffer zone sensors
			External sensor
	Additionally with	CHB-CB CHB-SB	Start new counting cycle
Diagnostic interface			RS 232 interface for laptop connection (cable included in scope of delivery)

Weights [g]			
For part sizes	∅ 10 mm	∅ 30 mm	∅ 80 mm
Control unit	6 000		
Conveying unit with 2 reject positions	4 000	7 000	12 000

Dimensions
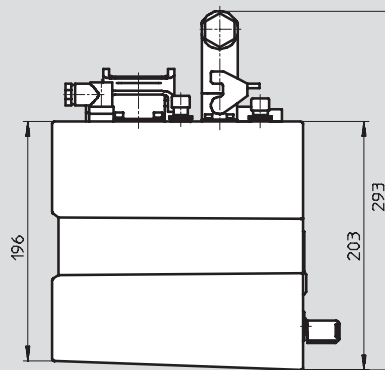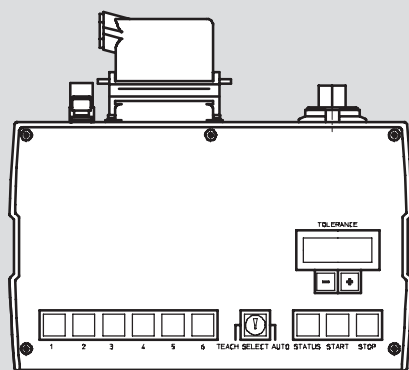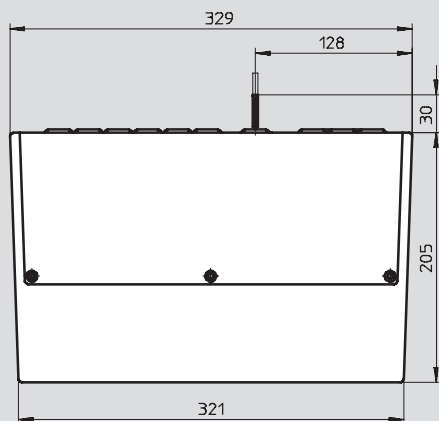
Control unit

Rear view (rotated 180°)
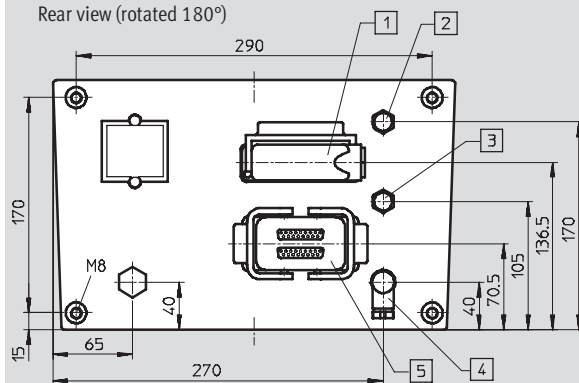
1	PLC coupling
2	RS 232 diagnostic interface
3	Small-parts conveyor control
4	Buffer zone sensors
5	Cable to conveying unit

Checkbox CHB

Technical data

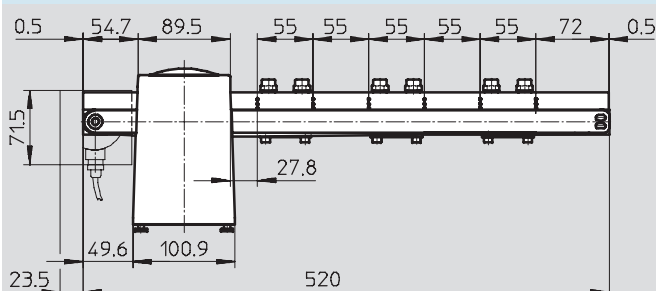**Dimensions – Conveying unit, part sizes up to ⌀ 10 mm**   Download CAD data ➔ **www.festo.com**

2 reject positions

	4x connecting thread M6 for 80x80 mm profile support
1	
2	2x connecting thread M8 for 50x50 mm profile support
3	Encoder (optional)
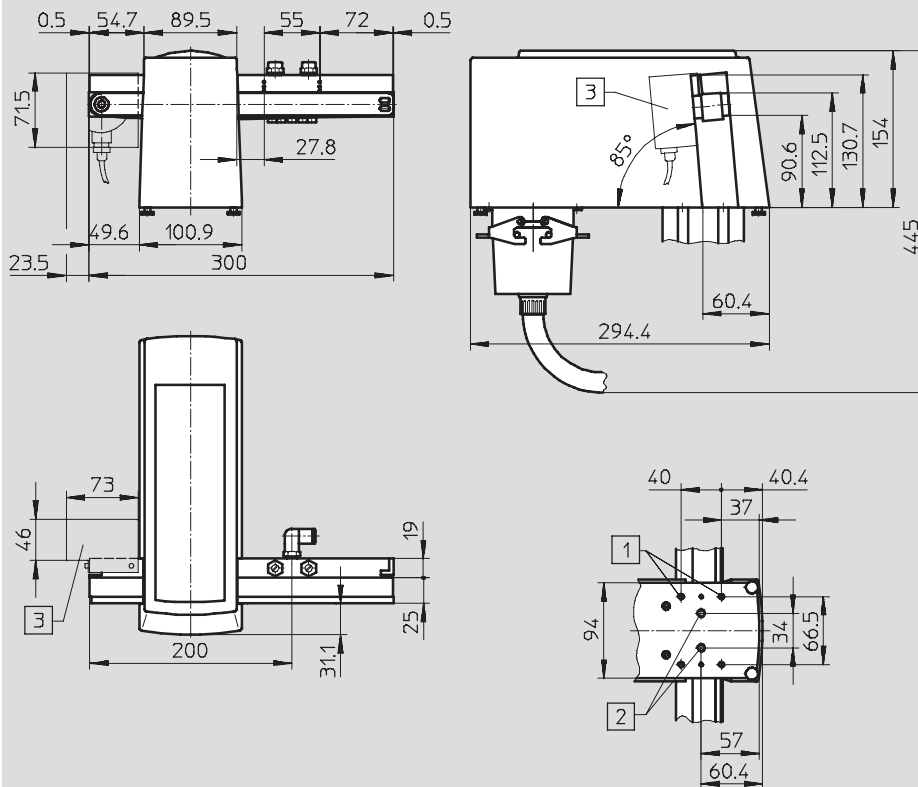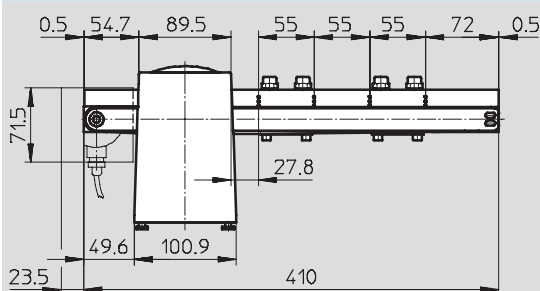
4 reject positions
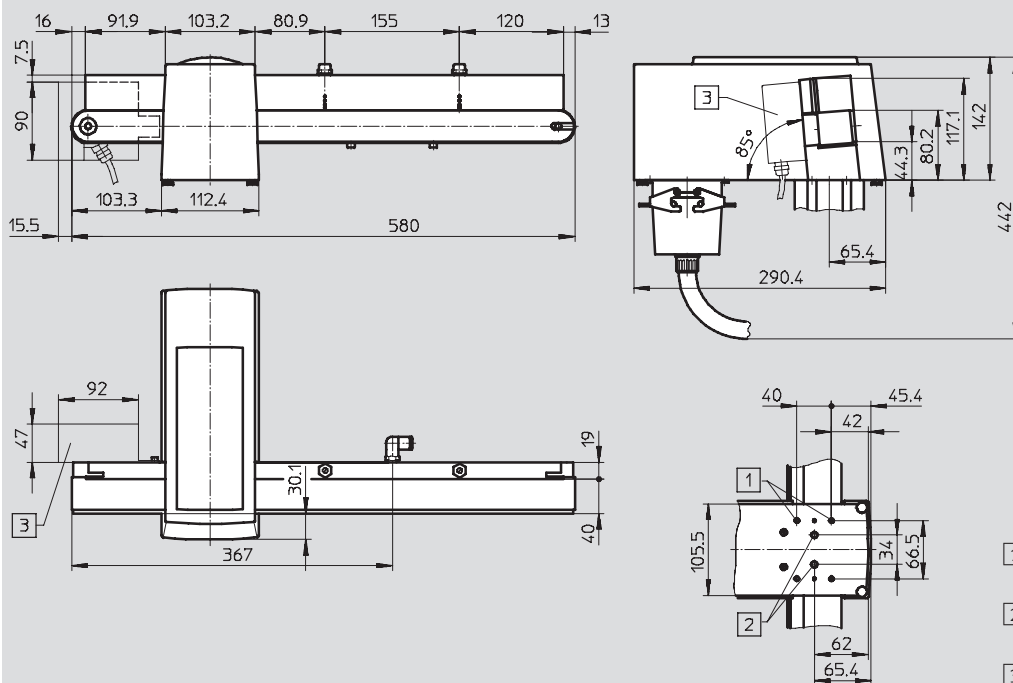

6 reject positions

Checkbox CHB

Technical data

FESTO

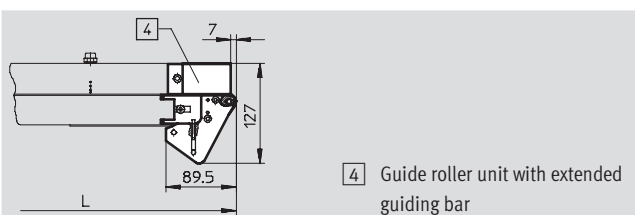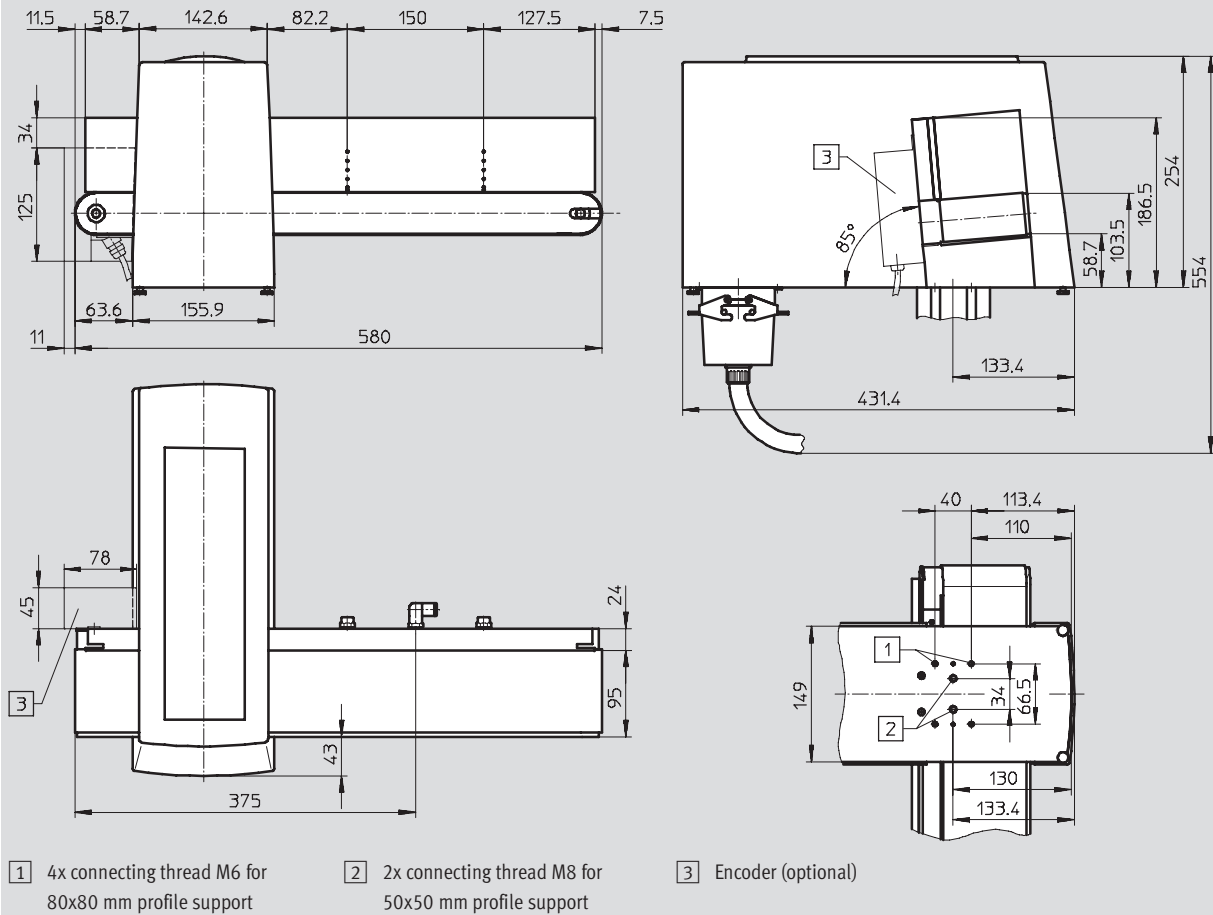**Dimensions – Conveying unit, part sizes up to ⌀ 30 mm**   Download CAD data ➔ www.festo.com

2 reject positions

16 | 91.9 | 103.2 | 80.9 | 155 | 120 | 13

7.5
90
15.5
103.3   112.4
580

92
47
30.1
3
367
19
40

3
85°
44.3   80.2   117.1   142
442
65.4
290.4

40   45.4
42
1
105.5
34   66.5
2
62
65.4

☐1 4x connecting thread M6 for
   80x80 mm profile support
☐2 2x connecting thread M8 for
   50x50 mm profile support
☐3 Encoder (optional)

4 reject positions

16 | 91.9 | 103.2 | 80.9 | 100 | 100 | 100 | 120 | 18

7.5
90
15.5
103.3   112.4
730

6 reject positions

16 | 91.9 | 103.2 | 80.9 | 90 | 90 | 90 | 90 | 90 | 120 | 18

7.5
90
15.5
103.3   112.4
880

4   7
127
89.5
L

☐4 Guide roller unit with extended
   guiding bar

Guide roller unit	
Reject positions	L
2	632
4	782
6	932

14   ➔ Internet: www.festo.com/catalogue/...   Subject to change – 2008/06

Checkbox CHB

Technical data

Dimensions – Conveying unit, part sizes up to ⌀ 80 mm

2 reject positions

11.5 58.7 142.6 82.2 150 127.5 7.5

34
125
63.6 155.9
11 580

3
85°
254
186.5
103.5
58.7
133.4
431.4

78
45
3
24
95
43
375

40 113.4
110
1
149
34 66.5
2
130
133.4

1	4x connecting thread M6 for 80x80 mm profile support	2	2x connecting thread M8 for 50x50 mm profile support	3	Encoder (optional)

Checkbox CHB

Technical data

Dimensions – Tunnel variant, for part sizes up to ⌀ 30 mm

Without reject positions and conveyor belt

Download CAD data ➜ **www.festo.com**

1	2x connecting thread M8 for 50x50 mm profile support
2	Part sizes ⌀ 3 ... ⌀ 30 mm
3	Conveyor belt
4	Guiding bar
5	Provide cutout for camera light beam (approx. 5°)

Dimensions – Tunnel variant, for part sizes up to ⌀ 80 mm

Without reject positions and conveyor belt

Download CAD data ➜ **www.festo.com**

1	2x connecting thread M8 for 50x50 mm profile support
2	Part sizes ⌀ 3 ... ⌀ 80 mm
3	Conveyor belt
4	Guiding bar

Checkbox CHB

Technical data

Dimensions – OEM variant, for part sizes up to ⌀ 30 mm

Without reject positions, conveyor belt and housing

Download CAD data ➔ **www.festo.com**

1	Camera with adapter, lens and extension tube
2	Camera bracket
3	Lighting bracket
4	Guiding bar for part guide
5	Parts conveyor
6	Viewing slot, 1 mm wide
7	Connection for light
8	Connection for camera

Lighting bracket

Camera bracket

Checkbox CHB

Technical data

FESTO

Dimensions – OEM variant, for part sizes up to ⌀ 80 mm

Download CAD data ➔ **www.festo.com**
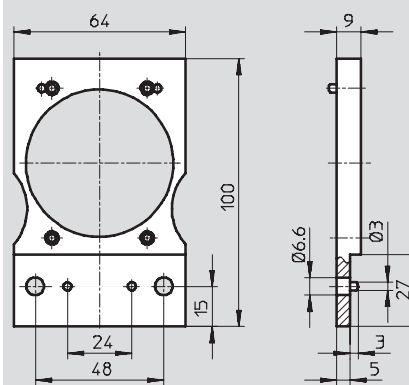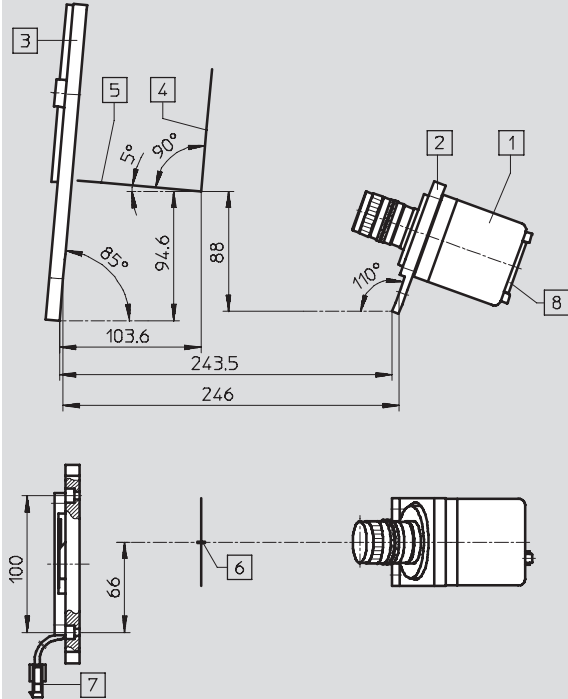
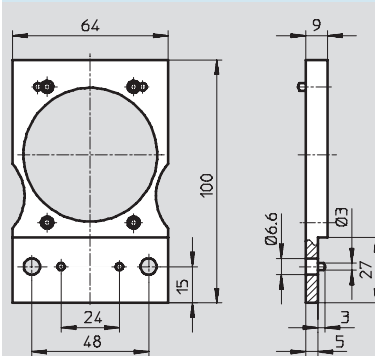Without reject positions, conveyor belt and housing

1	Camera with adapter, lens and extension tube
2	Camera bracket
3	Lighting bracket
4	Guiding bar for part guide
5	Parts conveyor
6	Viewing slot, 1 mm wide
7	Connection for light
8	Connection for camera

Lighting bracket
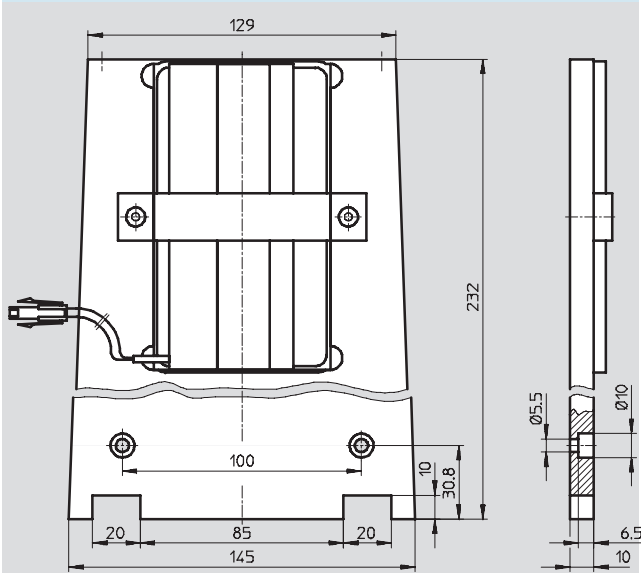
Camera bracket

Checkbox CHB

Accessories

Dimensions – Mounting options
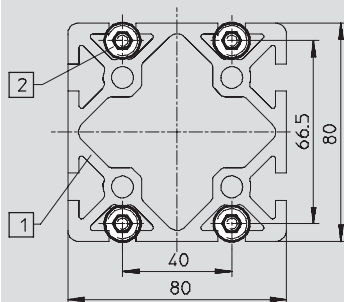
50x50 mm profile support
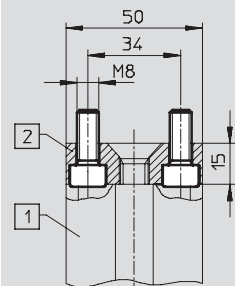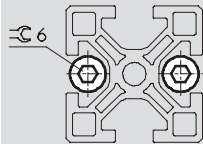
1	50x50 mm profile support
2	Profile connector HV-50
	as adapter

80x80 mm profile support
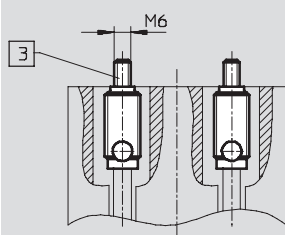
1	80x80 mm profile support
2	Automatic profile connector
3	4 socket head screws
	M6x40 DIN 912

Checkbox CHB

Ordering data – Modular products

M Mandatory data →

Module No.	Basic function	Control function	Component size	Transport function	Connecting cable	User manual
197 890	CHB	IB CB SB	F10 F30 F80	L2P R2P L4P R4P L6P R6P TU OEM	K20 K30 K50	D E F S I

Ordering example

197 890	CHB	–	SB	–	F30	–	L4P	–	K20	–	D

Ordering table

			Conditions	Code	Enter code
M	Module No.	**197 890**			
	Basic function	Checkbox family		**CHB**	CHB
	Control function	Identbox		**-IB**	
		Countbox		**-CB**	
		Sortbox		**-SB**	
	Component size	Part size ⌀ 0.5 … 10 mm, part length 3 mm and above		**-F10**	
		Part size ⌀ 3 … 30 mm, part length 3 mm and above		**-F30**	
		Part size ⌀ 3 … 80 mm, part length 5 mm and above	1	**-F80**	
	Transport function	2 reject positions, belt transport direction: to the left		**-L2P**	
		2 reject positions, belt transport direction: to the right		**-R2P**	
		4 reject positions, belt transport direction: to the left	2	**-L4P**	
		4 reject positions, belt transport direction: to the right	2	**-R4P**	
		6 reject positions, belt transport direction: to the left	2	**-L6P**	
		6 reject positions, belt transport direction: to the right	2	**-R6P**	
		No reject positions and conveyor belt	3	**-TU**	
		No reject positions, conveyor belt and housing	3	**-OEM**	
	Connecting cable	Cable length 2 m		**-K20**	
		Cable length 3 m		**-K30**	
		Cable length 5 m		**-K50**	
	User manual	German		**-D**	
		English		**-E**	
		French		**-F**	
		Spanish		**-S**	
		Italian		**-I**	

1 **F80** Not in combination with field of view V10 and V20.
2 **L4P, R4P, L6P, R6P** Not in combination with component size F80.
3 **TU, OEM** Not in combination with component size F10.

Transfer order code

197 890	CHB	–		–		–		–		–	

Checkbox CHB

Ordering data – Modular products

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ⓞ Options					
Additional function	**Field of view**	**Guiding bar material**	**Alternative conveyor belt**	**Belt end**	**Accessories**
EC	V10 V20 V33	VA	BTA BTB BTD	UE	MP
– **EC**	– **V33**	– **VA**	– **BTA**	– **UE**	– **MP**

Ordering table			Condi-tions	Code	Enter code
↓ Additional function	Encoder			**-EC**	
ⓞ Field of view	Adjustment of field of view to 10 mm		4	**-V10**	
	Adjustment of field of view to 20 mm		4	**-V20**	
	Adjustment of field of view to 33 mm		5	**-V33**	
Guiding bar material	Stainless steel			**-VA**	
Alternative conveyor belt	Conveyor belt with longitudinal ridges		6	**-BTA**	
	Conveyor belt with longitudinal recesses		6	**-BTB**	
	Conveyor belt with smooth surface, made of silicone		7	**-BTD**	
Belt end	Guide roller unit with belt		8	**-UE**	
Accessories (supplied loose)	Mounting plates			**-MP**	

4 **V10, V20**	Not in combination with component size F10, F80.	
5 **V33**	Not in combination with component size F10.	
6 **BTA, BTB**	Not in combination with component size F80. Not in combination with belt end UE.	

7 **BTD**	Not in combination with belt end UE.
8 **UE**	Not in combination with component size F30.

Transfer order code

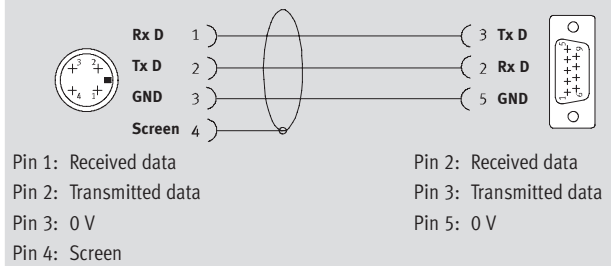– _____ – _____ – _____ – _____ – _____ – _____

Checkbox CHB

Accessories

Programming cable KDI

Material:
Cable sheath: Polyvinyl chloride
Round connector:
Polybutylenterephthalate
Socket: Steel

Terminal allocation

Rx D 1 — 3 Tx D
Tx D 2 — 2 Rx D
GND 3 — 5 GND
Screen 4

Pin 1: Received data
Pin 2: Transmitted data
Pin 3: 0 V
Pin 4: Screen

Pin 2: Received data
Pin 3: Transmitted data
Pin 5: 0 V

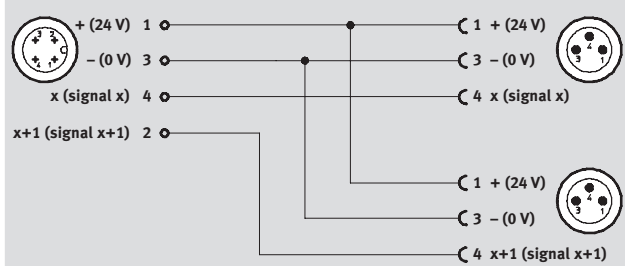| Ordering data					
Cable length [m]	Plug	Socket	Weight [g]	Part No.	Type
5	M12, 4-pin	9-pin	181	**150 268**	KDI-SB202-BU9

DUO cable KM12-DUO
for buffer zone sensors

Material:
Cable sheath: Polyurethane
Plug, socket: Polyurethane
Knurled screw, locknut: Brass

Terminal allocation

+ (24 V) 1 — 1 + (24 V)
– (0 V) 3 — 3 – (0 V)
x (signal x) 4 — 4 x (signal x)
x+1 (signal x+1) 2

1 + (24 V)
3 – (0 V)
4 x+1 (signal x+1)

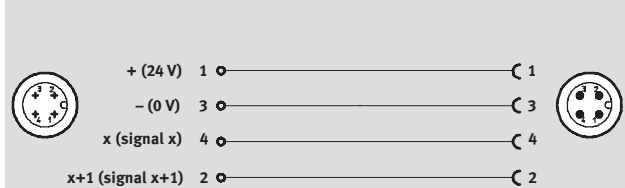| Ordering data					
Cable length [m]	Plug	Socket	Weight [g]	Part No.	Type
0.6	M12, 4-pin	M8, 3-pin	58.2	**18 685**	KM12-DUO-M8-GDGD

Connecting cable KM12-M12
for buffer zone sensors

Material:
Cable sheath: Polyurethane
Plug, socket: Polyurethane
Knurled screw, locknut: Brass

Terminal allocation

+ (24 V) 1 — 1
– (0 V) 3 — 3
x (signal x) 4 — 4
x+1 (signal x+1) 2 — 2

Ordering data					
Cable length [m]	Plug	Socket	Weight [g]	Part No.	Type
2.5	M12, 4-pin	M12, 4-pin	100.32	**18 684**	KM12-M12-GSGD-2,5
5			173.17	**18 686**	KM12-M12-GSGD-5

## Software to meet individual requirements

CheckKon

Performance characteristics

Using this software the processes within the Checkbox can be displayed, logged and adapted from the camera image evaluation through to the I/O parameters.

This means:
- Transfer of new programs to the Checkbox
- Display and editing of system parameters
- Display of the evaluation of the last inspected parts recorded
- Display and logging of part contour and characteristics derived
- Display and print-out of system configuration

CheckOpti
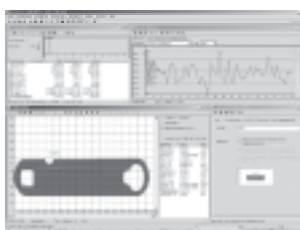
Performance characteristics

"CheckOpti" is used in cases where the standard Checkbox learning program reaches its limits due to the fact that contour differences are too small, meaning that part orientation or quality features cannot be reliably recognised.

"CheckOpti" facilitates a complete analysis of the Checkbox recognition processes based upon contour data for the parts to be checked.

Additional, high performance test features can be defined and optimised if necessary. The new configuration can be subsequently transferred to the Checkbox.

Ordering data – Software				
	Version	Language	Part No.	Type
	CheckKon software with manual	German, english	**194 496**	**P.SW-CB-KON**
	CheckOpti software with manual	German	**192 144**	**P.SW-CB-OPTI-DE**
		English	**192 145**	**P.SW-CB-OPTI-EN**

Checkbox CHB

Sample applications

Application examples

Orientation detection and quality inspection of lipstick tubes

The part check is carried out at a speed of 30 parts/s directly in a centrifuge.
The Checkbox controls the complete feed process, e.g. the start and switch-off reaction of the centrifuge or the rejection of incorrectly orientated or faulty parts.

The following features are checked:
• Orientation on the basis of a chamfer
• Length
• Diameter
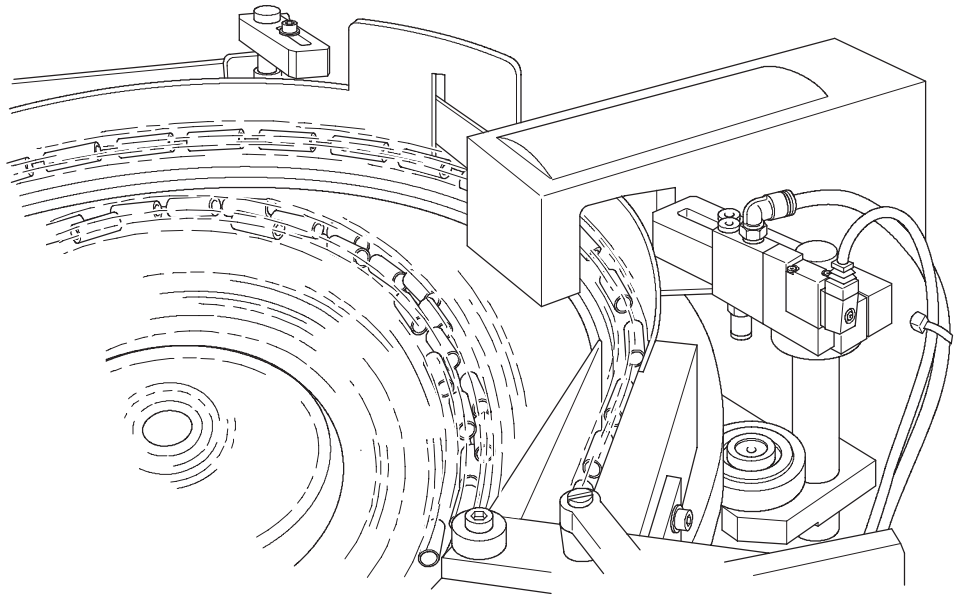
Orientation detection and type identification of valve springs

Checking valve springs and controlling the integrated turning station for the supply in a measuring and marking system. The Checkbox distinguishes reliably more than 100 spring types and by means of an electronic type memory permits conversion by the pressing of a button.

The following features are checked:
• Orientation
• Length
• Diameter