

*HIGH POWER
Nutrunning Equipment*

Product Catalog H 1

**Handheld Tools and
Nutrunner Controls**

H 1



H 1

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HIGH POWER Handheld Tools

H 1.0

Primary Features

■ **Powerful – Intelligent – Economical**

AMT handheld nutrunners are your ideal choice when it comes to safe fastening operations with consistently high accuracy. As partners with the automotive industry, we offer innovative and high-performance nutrunning systems that meet or exceed the rigid demands from our customer base.

■ **All From One Source**

As assembly technology specialists, we are able to offer, in addition to nutrunning technology, all peripheral equipment required for a workstation. This varies from a simple telescope to complex, semiautomatic handling devices. Our experts from the assembly technology area have many years of experience in the ergonomic design of assembly systems.

It is no wonder that many customers choose AMT for their nutrunning needs. A single partner for all applications related to the nutrunning process reduces planning and coordination efforts, which in turn reduces your overall cost.

■ **Safety in Assembly**

The quality of a fastened connection does not depend solely on the use of high-quality nutrunners. It also depends upon the operators who are using these tools. While considering solutions for our customers, therefore, we do not just think about the individual connections but also include the tool operator and configuration of his/her workstation in our design process. By doing this, errors can be avoided with the appropriate workstation layout. Fault recognition and troubleshooting, using innovative monitoring strategies, remains front and center.

Our nutrunner systems are, for example, capable of monitoring the correct fastening position, using camera, ultrasonic triangulation, or our patented Railnet system. As a result, missing fasteners and/or operations at the wrong fastener location are detected and avoided.

Of course, all data stored by the nutrunner control is available over network interfaces for documentation and additional processing by higher order computer systems.

■ **Pistol-Grip Nutrunner**

Torque up to 25 Nm
Speed up to 1481 rpm



■ **Angle Nutrunner**

Torque up to 250 Nm
Speed up to 1535 rpm



■ **Straight Nutrunner**

Torque up to 131 Nm
Speed up to 2388 rpm



HIGH POWER Handheld Tools

H 1.0

Primary Features

■ Drive

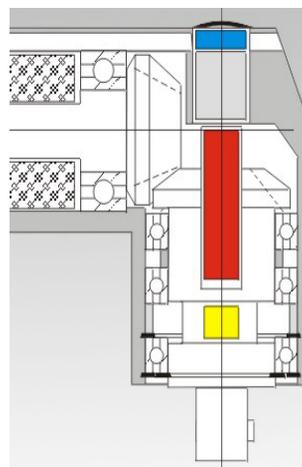
Short cycle times demand the use of higher powered drives. For this reason, all of our handheld tools are equipped with maintenance-free, high-dynamic electric motors.

■ Torque Recording

All handheld nutrunners come equipped with reaction torque sensors that are installed between the drive and output. They use strain gages with full bridge switches to record torque measurements with consistent reliability and accuracy.

■ Action Torque Sensors for Highest Accuracy

Action torque sensors eliminate side effects from the use of angular drives and can be used for applications that place the highest demands on accuracy. Torques are captured directly at the output shaft from the angular drive. As a result, changes in drive efficiency due to wear have no influence on the torque. The fastening process is completed correctly, based on accurate torque and regardless of the mechanical condition of the angular drive. This advantage is only available with AMT handheld nutrunners!



■ Integrated Maintenance Management

Even the most reliable tools suffer from natural wear over time. In order to keep this wear from progressing to an unexpected breakdown and potential stoppage of an assembly line, AMT nutrunners automatically signal when preventive maintenance is required. An integrated nutrunning cycle counter with a load-dependent evaluation ensures that required maintenance is signaled before a tool breaks down. This increases tool availability while, at the same time, reducing maintenance costs that occur from having to replace parts due to wear.

HIGH POWER Handheld Tools

H 1.0

Primary Features

■ **Ergonomic soft stop* keeps production costs to a minimum**

We safeguard the health of your employees!

The ergonomic soft stop improves shut-off behavior in handheld tools during the final tightening phase.

When using high tightening torques during a fastening operation, tension builds up in the operator's muscles. If the tool is simply shut off after the required torque has been reached, i.e. immediate torque-free shutdown, then the operator does not have the required reaction time to release muscle tension.

Instead, the operator's muscle tension releases itself in a jerking arm motion, which has a negative physiological effect on muscles, tendons, and joints.

In order to avoid these health risks, our handheld tools are configured with a soft stop, which is used to stop the tool after the required torque has been reached. The impact on the operator's muscles, tendons, and joints is reduced considerably as a result.

The minimization of stress to your staff and related downtime all result in production cost savings to you.

* The ergonomic soft stop is available for the following control systems:

- SMX10
- SMX20
- SMX30



HIGH POWER Handheld Tools

H 1.0

Primary Features

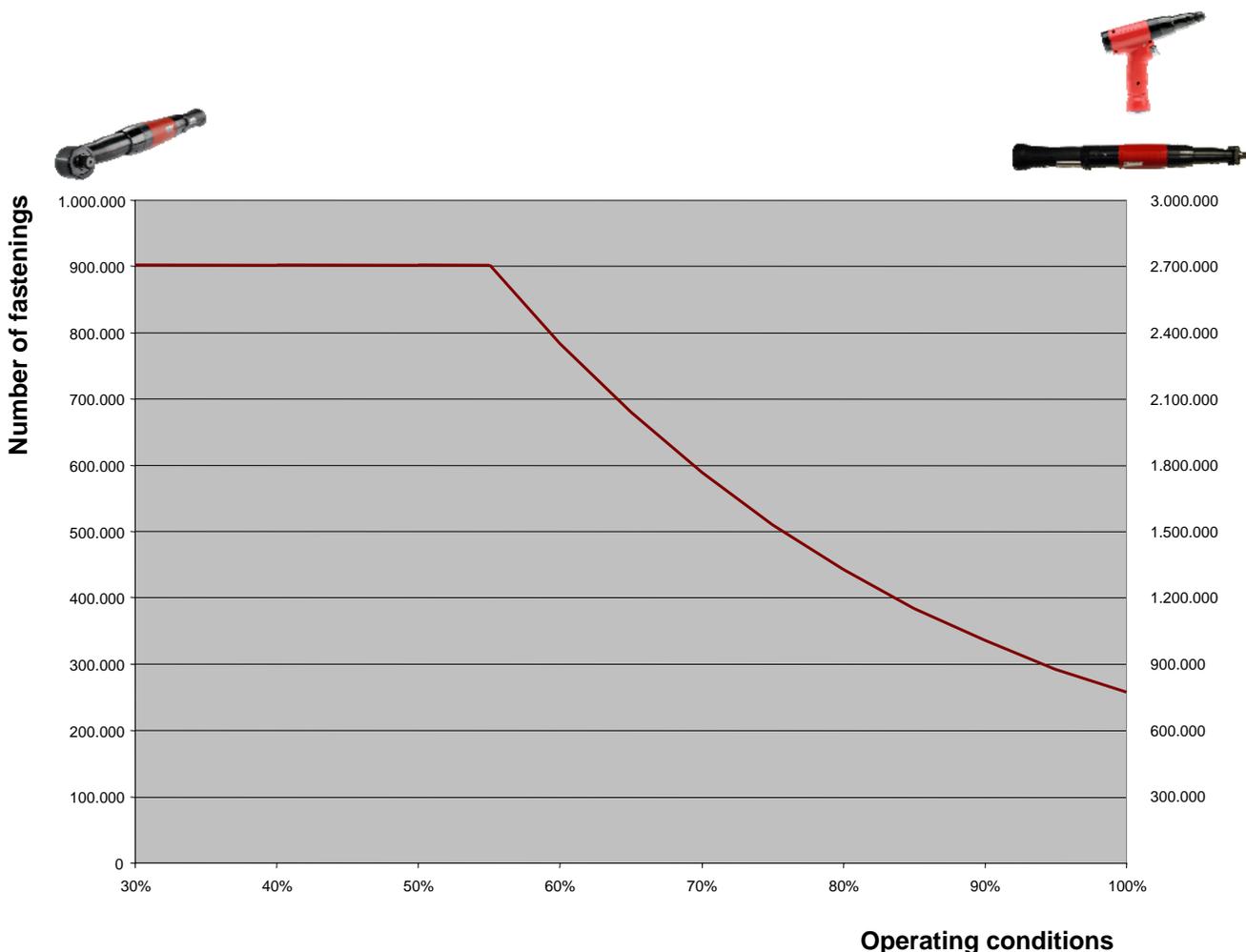
- We make maintenance affordable**

Reduced maintenance costs due to longer intervals between repairs!

Our integrated maintenance management system calculates the tool maintenance requirements based on load. By doing so, maintenance work is only required when it is absolutely necessary. As a result, our customers are not faced with high maintenance costs. The load-dependent maintenance requirements allow several tools to be operated over the entire runtime without maintenance

Maintenance is, therefore, only necessary when it is required and not when the cycle dictates it.

The load-dependent calculation of maintenance intervals is based on actual tool operating conditions. Therefore, the maintenance interval can be extended further by just using the next larger tool.



The new Handheld Tools HCX / PCX Primary Features



H 1.1

■ Ergonomic, capability, lightweight

Ergonomics, capability, and torque repeatability are demands of the automotive industry and their suppliers.

The new handheld tools fulfill these requirements and even more!

Using a new-generation, high-dynamic motor, it is possible to increase nutrunner power by up to 30 percent. The results are faster and more cost-efficient fastening operations.

The appealing design was developed in consideration of trend-setting ergonomic factors:

- Ergonomically formed hand grip
- Newly designed directional ring for clockwise / counterclockwise operation with additional user-programmable switch function (e.g. NOK acknowledgement, program advance, etc.)
- Status display indicates direction of rotation via LEDs and additional LED for enhanced display functions (e.g. NOK acknowledgement, release)
- Ergonomically arranged START key of electropolished stainless steel
- 1-part, ergonomically formed angle head (can be rotated 4 x 90°)
- Lightweight design

The optimized ergonomic design and lightweight configuration reduce operator strain. This leads to an **increase in individual productivity** and, as a result, a **reduction in running production costs**.

■ Robust design

Handheld tools from AMT are designed for rugged industrial applications. The polyamide hand grip has a high proportion of fiberglass and the motor housing is made from high-strength polyurethane. Both motor and gearbox are configured for long-life operation. This robust design leads to an **increase in lifetime** and, as a result, a **minimum in maintenance costs**.

■ New functions

- reverse ring with additional, user-defined switch function (e.g. NOT OK status, program continue switch, etc.)
- additional LED for expanded display functions (e.g. NOT OK status, release)
- electronics with integrated maintenance counter

■ Integrated data chip

The new handheld tools also feature an integrated data chip that stores all relevant tool data. This data can be automatically read on any AMT control, as soon as a new tool is connected to the control. Time consuming and tedious parameter definitions become a thing of the past. The data chip also stores the number of executed fastening cycles. This allows for the development of individualized service intervals, in line with preventive maintenance.

■ Safeguarding the fastening process

All handheld tools have reaction torque sensors, in addition to gathering rotation angle data from the resolver. As a result, fastening processes are performed with maximum precision and consistent quality. While recording the rotation angle, the control monitors whether or not the specified torque is actually being applied to the fastened assembly. In addition, the tool's current consumption, equivalent to the torque, is used as a redundant control variable in all AMT controls. By doing this, all requirements for safe, reliable, and high quality fastened assemblies are met.

■ Integrated barcode reader (AMT patent)

Prior to fastening, part ID is frequently checked with a barcode reader. Based on the part number, the correct fastening program is then retrieved from the nutrunner control. Upon successful completion, the part number and fastening data can then be stored in a quality database. The use of a separate barcode reader to scan a barcode is, however, a time-consuming process. AMT, therefore, integrated the barcode reader into the spindle. As a result, scanning and fastening can take place in one step. The resulting reduction in cycle time leads to a reduction in assembly cost.

■ Integrated ultrasonic transmitter

By using an ultrasonic triangulation system, tightening data can be allocated correctly to the individual tightening points. Preset process sequences, automatic selection of tightening parameters and quality statements after processing of the complete contents result in an extended process security.

Pistol-Grip Nutrunner PCX Reaction Torque Sensor

H 1.1.1

■ Technical Data

Size 1
up to 25 Nm



Designation code:

PCX1013ZV38

PCX = Pistol-grip nutrunner, brushless driving motor with a linear Hall sensor

1 = Size 1

03 = Capacity of nutrunner in Nm

Z = Centric design

V = Square drive

H = Hexagon socket

38 = Square drive with cylindrical spring pin
3/8", 1/2", 3/4"

	Max. torque capacity in Nm*	Torque range Nm	Type	Max. idle speed rpm	Length mm	Drive	Weight kg	Ident-No.
Sz. 1	13	3-11	PCX1013ZV38	1481	210	■ 3/8"	1,0	7900226
	13	3-11	PCX1013ZH14	1481	223	● 1/4"	1,0	7900242
	25	5-22	PCX1025ZV38	772	210	■ 3/8"	1,0	7900227

* Depending on the tightening operation / cycle time, the max. run down torque must be a maximum of 90% of the stated capacity.

Accessories

Type	Ident-No.
Serial barcode scanner	7006513
Adaption scanner	70000140
Suspension horizontal or vertical	70000139

Set of cables,
page 18



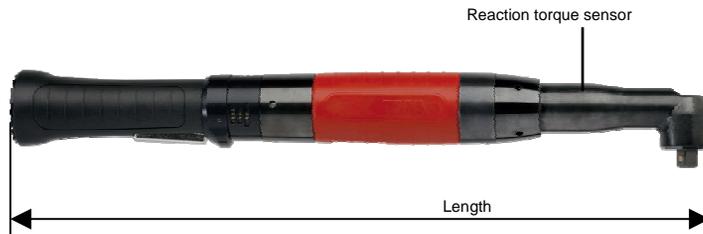
Handheld Nutrunner HCX Reaction Torque Sensor

H 1.1.2

■ Technical Data

Size 1
up to 105 Nm

Size 2
up to 250 Nm



Designation code: HCX1039WV38

HCX = Hand-held tool, brushless driving motor with a linear Hall sensor

1 = Size 1,2

039 = Capacity x 10 in Nm

W = Angle drive

V = Square drive

38 = Square drive with cylindrical spring pin
3/8", 1/2", 3/4"

	Max. torque capacity in Nm*	Torque range Nm	Type	Max. idle speed rpm	Length mm	Angle head Ø in mm	Drive	Weight kg	Ident-No.
Size 1	15	6 - 13	HCX1015WV14	1535	438	23	1/4"	1,3	790 0174
	25	7 - 22	HCX1025WV38	1367	440	28	3/8"	1,4	790 0175
	32	8 - 28	HCX1032WV38	1367	442	31	3/8"	1,4	790 0176
	39	10 - 35	HCX1039WV38	977	445	33	3/8"	1,5	790 0177
	64	16 - 57	HCX1064WV38	660	457	38	3/8"	1,6	790 0178
	100	27 - 94	HCX1100WV12	398	523	48	1/2"	2,5	790 0215
Size 2	100	25 - 90	HCX2100WV12	569	542	41	1/2"	3	790 0204
	150	38 - 136	HCX2150WV12	413	568	51	1/2"	3,3	790 0205
	200	52 - 186	HCX2200WV34	303	578	66	3/4"	3,8	790 0206
	250	63 - 225	HCX2250WV34	253	587	74	3/4"	4,1	790 0207

* Depending on the tightening operation / cycle time, the max. run down torque must be a maximum of 90% of the stated capacity.

**Set of cables,
page 18**



Angle Nutrunner HCR

H 1.1.3

Action Torque Sensor in the Angle Head

■ Technical Data

Size 1 up to 60 Nm	Size 2 up to 83 Nm	Size 3 up to 250 Nm
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Designation code:

HCR102A HWD1238-30

HCR = Hand-held tool, brushless driving motor, Resolver
 1 = Size 1, 2, 3
 02 = Capacity x 10 in Nm
 A = Adaption for angle head, with action torque sensor

H = Hand-held tool subassembly
 W = Angle drive
 D = Action torque sensor / digital
 1 = Size 1, 2, 3
 2 = Transmission (0 = Special drive)
 38 = Square drive with cylindrical spring pin 3/8", 1/2", 3/4"
 30 = Nominal torque of the torque sensor

	Max. torque capacity in Nm*	Torque range Nm	Type	Max. idle speed rpm	Length mm	Angle head Ø in mm	Drive	Weight kg	Ident-No.
Size 1	16	4 - 14	HCR101A HWD1238-30	1139	398	34	3/8"	2,2	790 0011
	30	6 - 27	HCR102A HWD1238-30	593	398	34	3/8"	2,2	790 0012
	39	8 - 35	HCR103A HWD1238-40	454	397	36	3/8"	2,3	790 0013
	60	12 - 54	HCR103A HWD1338-60	295	408	46	3/8"	2,5	790 0014
Size 2	49	10 - 44	HCR204A HWD2138-50	710	423	41	3/8"	2,8	790 0015
	62	13 - 55	HCR204A HWD2238-63	568	425	41	3/8"		790 0016
	83	18 - 74	HCR204A HWD2312-100	426	429	54	1/2"	3,1	790 0017
Size 3	100	20 - 90	HCR311A HWD3112-100	402	503	49	1/2"		790 0018
	150	30 - 135	HCR311A HWD3212-150	259	508	61	1/2"	5,2	790 0019
	200	40 - 180	HCR313A HWD3234-200	213	510	64	3/4"		790 0020
	250	50 - 225	HCR313A HWD3334-250	178	513	70	3/4"		790 0021

* Depending on the tightening operation / cycle time, the max. run down torque must be a maximum of 90% of the stated capacity.

Set of cables,
page 18



*Scratch / Collision Guard
for Handheld Tools HCX and HCR*

H 1.2

■ **Scratch Guard, PUR Material for Angle Nutrunner HCX**

Developed for use with safety-related technical parts.



	Spindle Type	Wall thickness in mm	Scratch guard Ident-No.
Sz. 1	HCX1015WV14	3	701 7743
	HCX1025WV38	3	701 7744
	HCX1032WV38	3	701 7745
	HCX1039WV38	3	701 7746
	HCX1064WV38	3	701 7769

Note:
On request available for other types.

■ **Collision Guard
Leather Material with Foam Lining for Angle Nutrunner HCR**

Developed for use with safety-related technical parts.



	Spindle Type	Wall thickness in mm	Collision guard Ident-No.
Sz. 3	HCR313D140HW3334	10	742 6839

Note:
On request available for other types.

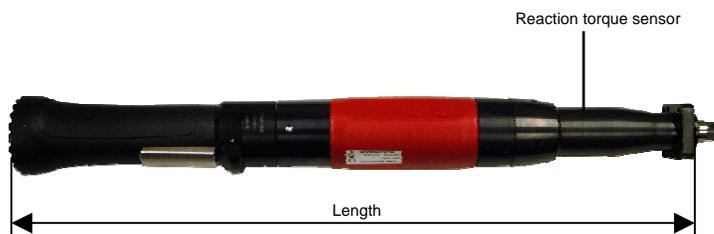
Straight Nutrunner HCX with Square Drive Reaction Torque Sensor

H 1.3.1

■ Technical Data

Size 1
up to 40 Nm

Size 2
up to 131 Nm



Designation code:

HCX1040ZV38

HCX = Hand-held tool, brushless driving motor with a linear Hall sensor

1 = Size 1,2

040 = Capacity of motor x 10 in Nm

Z = Centric drive

V = Square drive

38 = Square drive with cylindrical spring pin
3/8", 1/2", 3/4"

	Max. torque capacity in Nm	Torque range	Type	Max. idle speed rpm	Length	Drive	Weight kg	Ident-No.
Sz. 1	19	4 - 17	HCX1019ZV38	2388	414	3/8"	1,4	790 0179
	26	6 - 23	HCX1026ZV38	1777	414	3/8"	1,4	790 0180
	30	6 - 27	HCX1030ZV38	1466	414	3/8"	1,4	790 0181
	40	8 - 36	HCX1040ZV38	1122	418	3/8"	1,5	790 0182
Sz. 2	87	18 - 78	HCX2087ZV12	759	504	1/2"	2,7	790 0208
	131	27 - 117	HCX2131ZV12	506	508	1/2"	2,7	790 0209

* Depending on the tightening operation / cycle time, the max. run down torque must be a maximum of 90% of the stated capacity.

Set of cables,
page 18



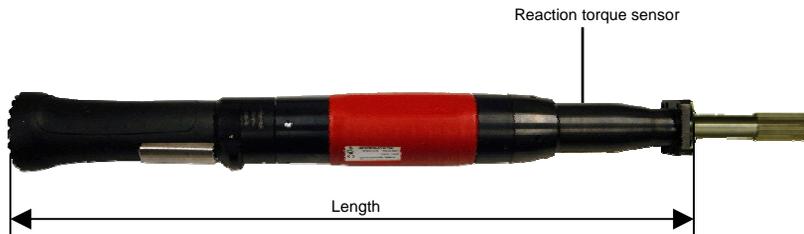
Straight Nutrunner HCX with Spring Travel Reaction Torque Sensor

H 1.3.2

■ Technical Data

Size 1
up to 40 Nm

Size 2
up to 131 Nm



Designation code:

HCX1040ZF50

HCX = Hand-held tool, brushless driving motor with a linear Hall sensor

1 = Size 1,2

040 = Capacity of motor x 10 in Nm

Z = Centric drive

F = Spring travel

50 = Spring travel 50mm

	Max. torque capacity in Nm	Torque range	Type	Max. idle speed rpm	Length mm	Spring travel mm	Weight kg	Ident-No.
Sz. 1	19	4 - 17	HCX1019ZF50	2388	414	50	1,5	790 0187
	26	6 - 23	HCX1026ZF50	1777	414	50	1,5	790 0188
	30	6 - 27	HCX1030ZF50	1466	414	50	1,5	790 0189
	40	8 - 36	HCX1040ZF50	1122	418	50	1,5	790 0190
Sz. 2	87	18 - 78	HCX2087ZF50	759	504	50	2,8	790 0210
	131	27 - 117	HCX2131ZF50	506	508	50	2,8	790 0211

* Depending on the tightening operation / cycle time, the max. run down torque must be a maximum of 90% of the stated capacity.

Set of cables,
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Socket adaptors,
page 17

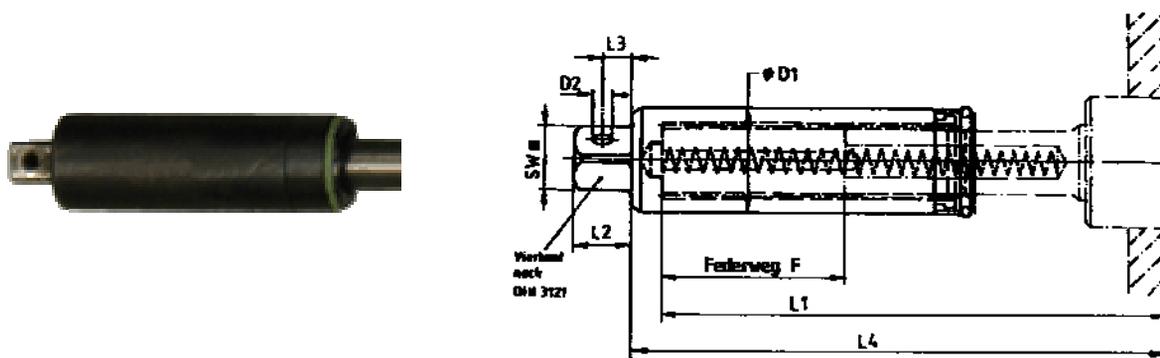


Socket Adaptors for Straight Nutrunners

H 1.4

Socket Adaptors with 50mm Spring Travel and External Square Drive

■ Technical Data



	Socket type	Suitable for type	Drive <input type="checkbox"/>	Spring travel mm	Spring resistance min/max Nm	D1 mm	D2 mm	L1 mm	L2 mm	L3 mm	L4 mm	Max. Md Nm	Ident-No.
Sz.1	SK-1	HCX1019ZF50	3/8"	50	12 - 30	22	3,5	142	10,4	5,5	149	63	700 2230
	SK-1	HCX1026ZF50	3/8"	50	12 - 30	22	3,5	142	10,4	5,5	149	63	700 2230
	SK-1	HCX1030ZF50	3/8"	50	12 - 30	22	3,5	142	10,4	5,5	149	63	700 2230
	SK-1	HCX1040ZF50	3/8"	50	12 - 30	22	3,5	142	10,4	5,5	149	63	700 2230
Sz.2	SK-2	HCX2087ZF50	1/2"	50	20 - 40	28	4,3	151	15,5	8,0	165	165	700 2049
	SK-2	HCX2131ZF50	1/2"	50	20 - 40	28	4,3	151	15,5	8,0	165	165	700 2049

Set of cables

H 1.5

Tool cables for hand-held tools

■ Tool Cable for HCX and PCX, straight



Designation	Length	Ident-No
Tool cable	3 Meter	701 8003
Tool cable	5 Meter	701 8005
Tool cable	7 Meter	701 8007
Tool cable	10 Meter	701 8010
Tool cable	15 Meter	701 8015

■ Tool Cable for HCX and PCX, straight, turnable by 330°



Designation	Length	Ident-No
Tool cable	3 Meter	701 8103
Tool cable	5 Meter	701 8105
Tool cable	7 Meter	701 8107
Tool cable	10 Meter	701 8110
Tool cable	15 Meter	701 8115

■ Tool Cable for HCX and PCX, angled by 90°, turnable by 330°



Designation	Length	Ident-No
Tool cable	3 Meter	701 8203
Tool cable	5 Meter	701 8205
Tool cable	7 Meter	701 8207
Tool cable	10 Meter	701 8210
Tool cable	15 Meter	701 8215

■ Straight Tool Cable for Angle Nutrunner HCR



Designation	Length	Ident-No
Tool cable	3 Meter	701 6703
Tool cable	5 Meter	701 6705
Tool cable	7 Meter	701 6707
Tool cable	10 Meter	701 6710
Tool cable	15 Meter	701 6715

Note:

Extension cables can be supplied to customer's requirements.
The total length of a tool cable must not exceed 50 meters.

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HIGH POWER Nutrunner Controls

H 1.6

■ **Control systems for handheld nutrunners**

AMT offers a broad spectrum of nutrunner controls, which were developed as a result of diversified requirements from our customer base. A modular systems architecture provides custom solutions for even the most complex demands.

The SMD10 is our most cost-effective introductory model into the world of electric nutrunning technology. It offers up to 15 nutrunning programs and accommodates our handheld tools with reaction torque sensor.

The SMXP sets new standards at the high end of the performance scale. Thanks to an integrated PC, there are almost no limits in regard to the nutrunning process, network capabilities, and integration with higher level host computers and quality management systems. The modular software architecture on the SMXP makes it possible to adapt control software to just about any application. And what if the software, despite its powerful range of functions, still doesn't meet your needs? No problem! Our strength lies in developing individual software solutions for customer requirements, building on our tried and true base software.

The functionality of the SMXP also allows the connection of multi-channel, decentralized control topologies. Up to 9 cost-effective SMX10 controls can be connected to the SMXP. The SMX10 is just as powerful as the SMXP when it comes to the nutrunning process, but without an integrated PC. For this reason, the interface to higher level systems takes place through the SMXP. The resulting master-slave configuration offers a high range of performance at a favorable price.

The SMXP Twin control was developed for efficient and cost-effective 2-channel applications. It offers the same capabilities as the SMXP control. Despite the 2-channel configuration, no cooling element is required for the SMXP Twin control.



• **SMD10**



• **SMX10**



• **SMX20**



• **SMX30**
Narrow



• **SMX30**
Long



• **SMXP twin**



• **SMXP**

Nutrunner Control SMD10 Single-Channel

H 1.6.1

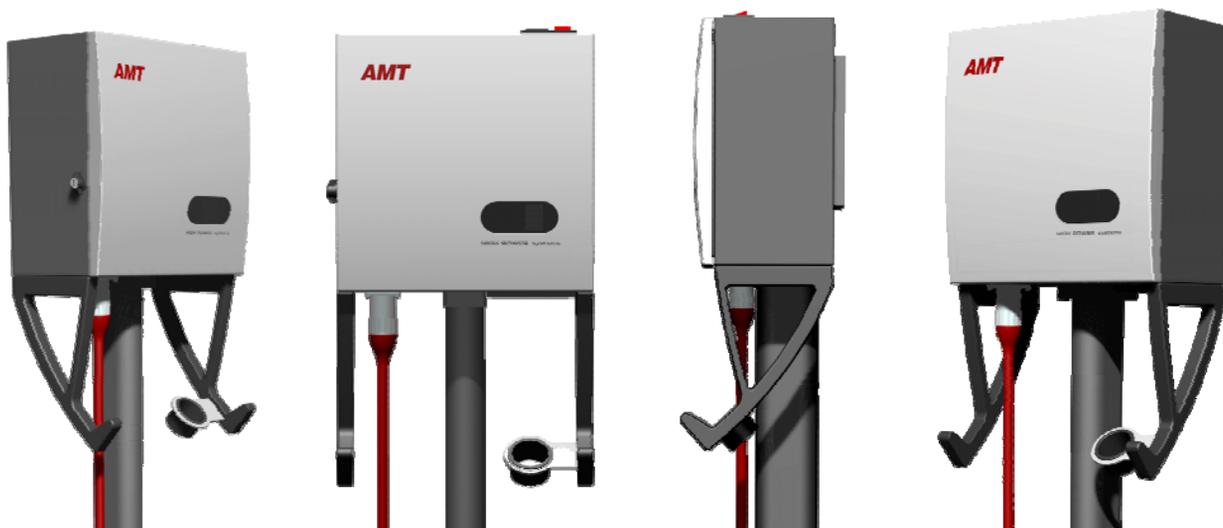
■ General information

Cost-effective entry into EC Nutrunner technology

Pneumatic nutrunners are still used frequently for many tightening tasks. However, increased demands on quality and assembly process safety and reliability have led to an increased interest in high-tech EC nutrunner technology. The SMD10 nutrunner control was developed for just this purpose. It combines the demand for a cost-effective tightening system with the advantages of state-of-the-art EC nutrunning technology.

Torque sensors guarantee high-precision connections

All nutrunning tools for the SMD10 are equipped with torque sensors and also store the rotation angle. The SMD10 provides, therefore, precision torque with consistent quality. By storing the rotation angle, the control monitors whether or not the specified torque is actually being applied to the bolted assembly. In addition, the tool's current consumption, equivalent to the torque, is used as a redundant control variable. By doing this, all requirements for safe, reliable, and high-quality bolted assemblies are met by the SMD10.



Nutrunner Control SMD10

H 1.6.1

Single-Channel

■ Special Features – Technical Data

Assembly

- Housing brackets for wall / mounting on support element
- IP54 protection

Display and Operator Controls

- 7-digit display

Programming and Parameterization

- RS232/485 serial interface
- User-friendly software for Windows XP-compatible laptops

Tightening Method

- Torque control with angle monitoring
- Angle control with torque monitoring
- Angle-controlled loosening
- Yield point control

Interfaces

- RS232/485 programming and data interfaces
- Parallel I/O to connect operator panels and socket box or used as BMS interfaces, e.g. to SPS

Periphery

- Operator panel
- Socket box

Number of Programs

- 4, 6 or 15 (depends on the selection)

Additional Functions

- Counter function embedded in program

Compatible Nutrunners

- HCR, HCRK, PCR, HCX and PCX series handheld nutrunners with reaction torque sensors
- ECR1 and ECR2 assembly nutrunners with reaction torque sensors, as long as emergency stop is not required



Type	Dimensions (HxWxD) in mm	Weight in kg	Ident-No.
SMD10 40ASH	330x330x180	approx. 11	700 9928

Nutrunner Control SMX10 Single-Channel

H 1.6.2

■ General Information

Most cost-effective control for documentdriven fastening applications

The SMX10 offers the same nutrunning features as the Master control (SMX20, SMX30, SMXP), without an integrated PC. It was developed especially for use in networks and is generally driven as a “slave” component. A internal bus-system (Ident-No. 700 9937) provides communication capabilities with a AMT Master control (SMX20, SMX30, SMXP). An Ethernet interface (Ident-No. 700 9943) provides communication capabilities with a plant’s master control (e.g., PC) or an SMX30.

In slave mode, the SMX10 receives program requirements from a master, based on target data that is either stored locally or downloaded from a host computer. These are then processed by the SMX10 in a self-sufficient manner. After each fastening operation, rundown results and graphs are reported back to the master.

Manual operation

Manual operation mode is available with the SMX10 nutrunner control for operation without a master. The control functions in this mode without communication to a master control. This means that it is not possible to form overall part-based quality assessments. Programs are determined by a program selector switch on the operator panel or by a socket tray. If only one program is required, then this can also be permanently set.

Rundown results are stored locally on the nutrunner control in this mode and uploaded to the master control after reconnection. If parts are identified by a barcode reader, then the part number is also assigned to rundown results in this operating mode.

Enhanced nutrunning and monitoring processes

The SMX10 offers programming capabilities for complex nutrunning processes. All torque and angle-controlled algorithms are available as base modules. These modules, along with additional commands for process control, can be linked to create complex nutrunning processes. Conditional program statements can be based on rundown results, which enable, for example, loosening operations with or without repeated nutrunning. In addition, the control offers advanced nutrunning and monitoring processes, such as yield control, retrospective nutrunning monitor, and friction measurement. The SMX10 can be programmed with a userfriendly interface that resides on a laptop or master-PC.



Nutrunner Control SMX10

H 1.6.2

Single-Channel

■ Special Features – Technical Data

Assembly

- Housing brackets for wall / mounting on support element
- IP54 protection

Display and Operator Controls

- 7-digit display for status and error messages
- 4 LEDs to display individual nutrunning and operational status

Programming und Parameter Definition

- User-friendly programming software via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle monitor
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Interfaces

- Serial interface for barcode reader
- Parallel I/O
- Ethernet

Peripheral Equipment

- Operator console
- Socket tray
- Barcode reader

Number of Programs

Slave mode

- max. 31 tightening programs and 1 loosening program

Manual operation

- 1 program without operator console or socket tray
- max. 8 tightening programs with socket tray
- max. 15 tightening programs with operator console
- with program selection switch
- 1 loosening program

Spindle Types

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors



Type	Dimensions control (HxWxD) in mm	Dimensions wall console (HxWxD) in mm	Total dimensions (HxWxD) in mm	Weight in kg	Ident-No.
SMX10 40ASH 02	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9937
SMX10 40ASH 02 ETH*	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9943

* Version ETH (Ethernet) only in connection with a Master PC to be made available by the customer.

Nutrunner Control SMX20

H 1.6.3

Single-Channel

■ General Information

High-end control in compact design without touch display

The SMX20 is a high-end nutrunner control, which can handle more extensive tasks than just controlling the fastening process. The use of a PC in 3.5" format enables unlimited functionality.

The SMX20 offers the same fastening and cycle functions as our other Master controls (SMX30, SMXP). However, the SMX20 does not have an integrated display. The SMX20 was developed specifically for applications which do not require a graphic display. This might be the case, for example, if a control is not located within the worker's field of vision or if visualisation units at the customer's will be used.

Flexibility through integrated PC

An integrated PC expands SMX20 functionality considerably, when compared to conventional controls. For example, it allows you to establish a direct connection to your host computer.

The operating system, programs, and system data are stored on a write-protect Compact-Flash card, with temporary data stored on a second CompactFlash card. The operating system, Windows XP Embedded, is condensed to provide only the necessary functions, while offering maximum protection against network virus attacks.

Programming complex nutrunning processes

The SMX20 offers programming capabilities for complex nutrunning processes. All torque and angle-based algorithms are available as base modules. These modules, along with additional commands for process control, can be linked with a user-friendly parameter software to create complex nutrunning processes. Conditional program statements can be based on rundown results, which enable, for example, loosening operations with or without repeated nutrunning. In addition, the control offers advanced nutrunning and monitoring processes, such as yield control, retrospective nutrunning monitor, and friction measurement.

Operation, configuration, parameterization and display

SMX20 operation, configuration, parameterization and display is controlled by the network or by direct connection of a monitor, mouse, or keyboard.



Automatic tool identification

Handheld tools from AMT are equipped with data storage, in which all tool-specific parameters are stored. When the tool is connected to the SMX20 control, this data is read and compared with the archived data stored on the control.

If these data do not agree, then the tool is not accepted by the control, and a fault message is issued. If the operator acknowledges the situation manually, the new data can be transferred.

Fastening case analysis

A user-friendly operator interface is available for analyzing fastening cases. Up to 999 fastening curves can be displayed and stored for later evaluation. This display is activated by date and time, as well as a value for the number of fastening curves requested. The displayed curves can be scanned and zoomed, as needed. For further analysis, up to 99 curves can be overlaid so that the intersection of each curve can be placed on the swell torque.

Nutrunner Control SMX20

H 1.6.3

Single-Channel

■ Special Features – Technical Data

Assembly

- Four assembly mounting holes in wall console
- IP54 protection

Display and Operator Controls

- 7-digit display for status and error messages
- 4 LEDs to display individual nutrunning and operational status

Programming und Parameter Definition

- User-friendly programming software via network
- Connection of external monitor, mouse and keyboard.

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle monitor
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Interfaces

- 2 x Ethernet
- RS232, RS485
- USB
- Field bus systems available with expansion cards (optional)

Peripheral Equipment

- Operator console
- Socket tray
- Signalers (e.g., stacklight, alarm horn, etc.)
- I/O modules (parallel)
- Barcode reader, read/write devices (e.g., Moby E)

Number of Programs

- Max. 31



Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation, iTeleskop)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Integration in our RailNet system for wireless power supply and positioning of nutrunner control on assembly line
- Centralized parameter management

Spindle Types

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors

Nutrunner Control SMX20 Single-Channel

H 1.6.3

■ Overview Nutrunner Controls SMX20

Designation code:

SMX20 40ASH 02 EA

SMX = Designation nutrunner control generation

20 = Nutrunner control type

40A = Power class of output stage

SH = Internal designation

02 = Version number

EA = Parallel I/O interface

IBS = Interbus Slave interface

IBM = Interbus Master interface

PBS = Profibus Slave interface

DNS = Device Net Slave interface

Further interfaces on request



Type	Dimensions control (HxWxD) in mm	Dimensions wall console (HxWxD) in mm	Total dimensions (HxWxD) in mm	Weight in kg	Ident-No.
SMX20 40ASH 02	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9938
SMX20 40ASH 02 EA	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9945
SMX20 40ASH 02 IBS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9946
SMX20 40ASH 02 IBM	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9947
SMX20 40ASH 02 PBS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9948
SMX20 40ASH 02 DNS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9949

Nutrunner Control SMX20

Single-Channel

H 1.6.3

■ Options

For your information:

The following options are already included in the nutrunner control part number.

Parallel I/O board

PC104 slot

- Part No. 701 6617

The PC104 DIGIO16/16 is a digital I/O module. The 16 inputs and 16 outputs are designed for 24V operation and are isolated by an opto-electronic coupler (3kV). The digital outputs can be switched 24V/500mA (high-side) and are protected against overload and/or overheating.

Interbus board Slave

PC104 slot

- Part No. 701 7664

The slave communications interface in the InterBus network independently transfers data between the bus subscribers and the nutrunner control. The process image is held in dual-port memory and is, therefore, directly available to the application.

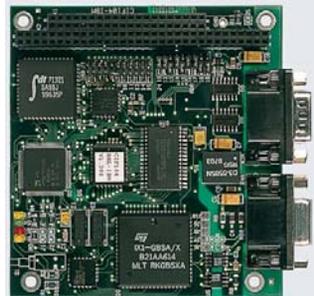


Interbus board Master

PC104 slot

- Part No. 701 7665

The master communications interface in the InterBus network independently transfers data between the bus subscribers and the nutrunner control. The process image is held in dual-port memory and is, therefore, directly available to the application.



Nutrunner Control SMX20

H 1.6.3

Single-Channel

■ Options

For your information:

The following options are already included in the nutrunner control part number.

Device Net Slave

Anybus slot

- Part No. 701 7908



The communications module provides optimized connection of our nutrunner control to an automation device. It is typically used where larger amounts of data need to be transferred at high speed. The DeviceNet module supports a bandwidth of max. 256 Byte input and 256 Byte output data, as well as all transfer rates from 125 - 500 Kbit/s. The module offers the complete functional range of a DeviceNet adapter for implicit und explicit messaging and supports UCMM. The DeviceNet interface is completely isolated galvanically. "Polled I/O", "bitstrobed I/O", "change of state" and "cyclic I/O" are all supported. In addition to the standard DeviceNet objects "identity", "message router", "DeviceNet", "assembly", "connection" und "acknowledge handler", the following manufacturer-specific objects are pre-defined: "I/O data input", "I/O data output", "diagnostic", "parameter input", and "parameter output". Two diagnostic LEDs signal the current DeviceNet status and any fault messages. The module is supplied with the mandatory 5-pin DeviceNet threaded terminal clamp.

PROFIBUS Slave

Anybus slot

- Part No. 701 7907



PROFIBUS (Process Field Bus) is a universal fieldbus which has broad application in manufacturing and process automation. PROFIBUS enables communication between our nutrunner control and your SPS without the need for special interface adaptation.

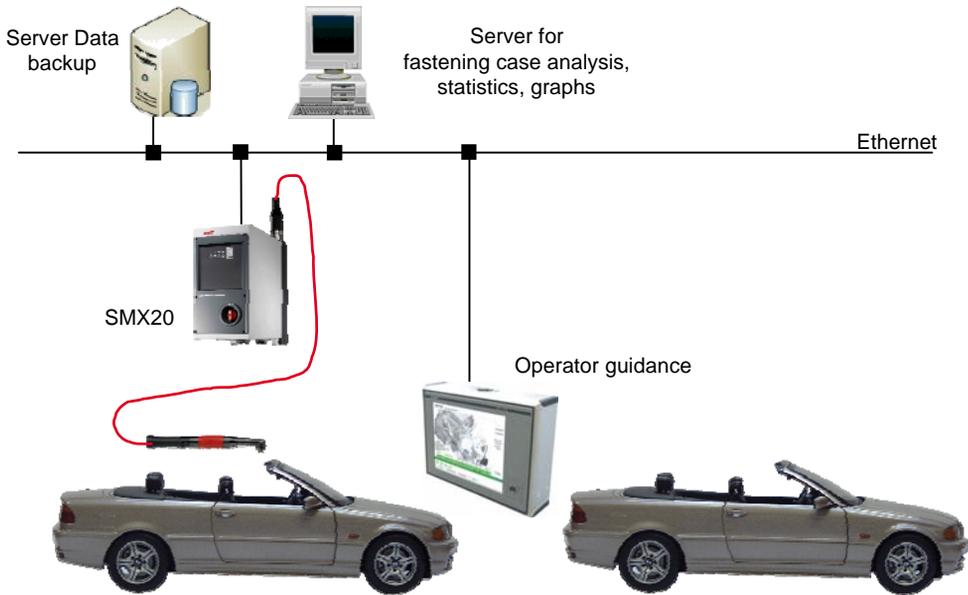
PROFIBUS is suitable for fast, time-critical applications, as well as complex communication tasks. The PROFIBUS Slave board contains bus access authorization, i.e. only received messages are acknowledged or, upon request from the Master, messages can be transmitted. The module supports a maximum PROFIBUS bandwidth of 244 Bytes for cyclic I/O data and additional acyclic data and diagnostic messages. The PROFIBUS transfer speed is recognized automatically in the range of 9.6 Kbit/s up to 12 Mbit/s. Two diagnostic LEDs signal the current DeviceNet status and any fault messages. The bus is connected by the mandatory 9-pin D-Sub jack.

Nutrunner Control SMX20

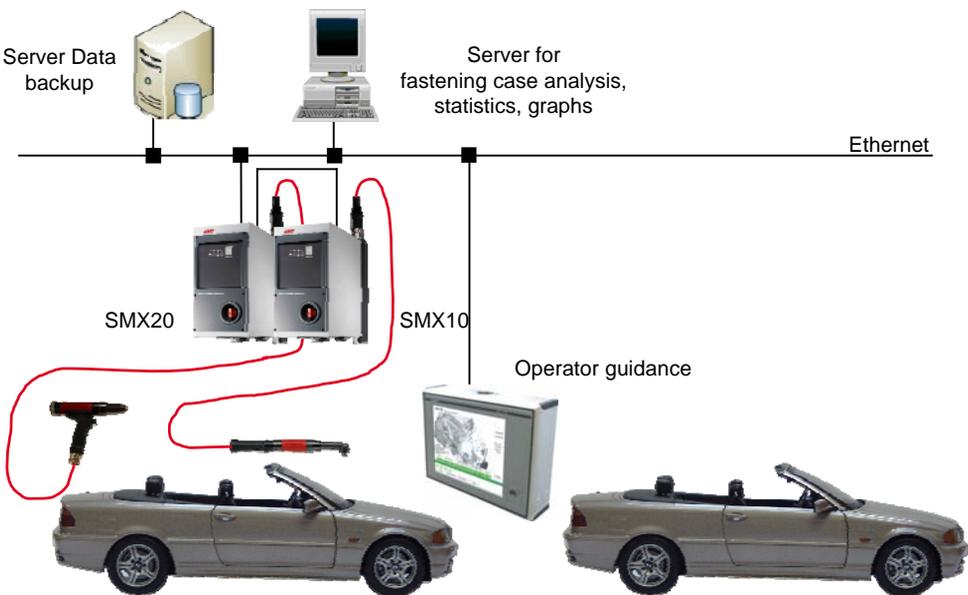
H 1.6.3

Configuration Examples

- *SMX20, connected to a customer-supplied graphic display unit*



- *SMX20 + SMX10, connected to a customer-supplied graphic display unit*



Notes

Notes

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Notes
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Note

Nutrunner Control SMX30

H 1.6.4

Single-Channel

■ General Information

High-end control in compact design

The SMX30 is the natural advancement to our successful SMXP high-end nutrunner control. By using a PC in 3.5" format, the size of the control is significantly reduced in size – while maintaining the same range of functions! The SMX30 nutrunner control is available in two configurations: 'narrow' for all applications with limited available width and 'long' for applications with limited available depth.

Flexibility through integrated PC

An integrated PC expands SMX30 functionality considerably, when compared to conventional controls. For example, it allows you to establish a direct connection to your host computer.

The operating system, programs, and system data are stored on a write-protect Compact-Flash card, with temporary data stored on a second Compact-Flash card. The operating system, Windows XP Embedded, is condensed to provide only the necessary functions, while offering maximum protection against network virus attacks.

Programming complex nutrunning processes

The SMX30 offers programming capabilities for complex nutrunning processes. All torque and angle-based algorithms are available as base modules. These modules, along with additional commands for process control, can be linked with a user-friendly parameter software to create complex nutrunning processes. Conditional program statements can be based on rundown results, which enable, for example, loosening operations with or without repeated nutrunning. In addition, the control offers advanced nutrunning and monitoring processes, such as yield control, retrospective nutrunning monitor, and friction measurement.

Quality assurance documentation

Rundown results and graphs can be stored locally or uploaded to a host computer.

Automatic tool identification

Handheld tools from AMT are equipped with data storage, in which all tool-specific parameters are stored. When the tool is connected to the SMX30 control, this data is read and compared with the archived data stored on the control.

If these data do not agree, then the tool is not accepted by the control, and a fault message is issued. If the operator acknowledges the situation manually, the new data can be transferred.

Fastening case analysis

A user-friendly operator interface is available for analyzing fastening cases. Up to 999 fastening curves can be displayed and stored for later evaluation. This display is activated by date and time, as well as a value for the number of fastening curves requested. The displayed curves can be scanned and zoomed, as needed. For further analysis, up to 99 curves can be overlaid so that the intersection of each curve can be placed on the swell torque.

Operation, configuration and display

A 6.5" touch-screen display facilitates the operation, configuration and graphic interface.

Programming and parameterization

With user-friendly network programming software.



Narrow
330x180x379
(HxBxT) in mm

Long
330x379x180
(HxBxT) in mm

Nutrunner Control SMX30 Single-Channel

H 1.6.4

■ General Information

Nutrunner Data Management

The SMX30 stores nutrunner data on the local Compact-Flash card to monitor the quality of the nutrunning process. If desired, the data can be stored for up to 12 months on the hard drive.

Access Restriction by User Groups

A key factor in securing the nutrunning process is the protection of the nutrunner control from unauthorized access. Frequently, only a limited number of employees are allowed to modify the nutrunning parameters. The SMXP is capable of managing an access hierarchy with up to 5 user groups. Authorization is password-protected.

Enhanced Process Control

The SMX30 is often used for quality-critical nutrunning applications, where the fastening process is accompanied by additional process control measures. One example for this would be the recognition of nutrunning locations by ultrasonic triangulation.

It is possible with this process to have an automatic correlation between the tightening parameters and the actual values for each fastener. The software required for this is simply installed on the integrated PC.

Ask us about more process control possibilities!

Local nutrunning network configurations

It is possible to create a local, cost-effective nutrunning network with the SMX30. Up to nine SMX10 nutrunner controls can be linked via Ethernet to an SMX30. The SMX30 also functions in this case as a master control, communicating with customer systems, e.g., conveyor control system or host computer, and coordinates all connected SMX10 slaves.

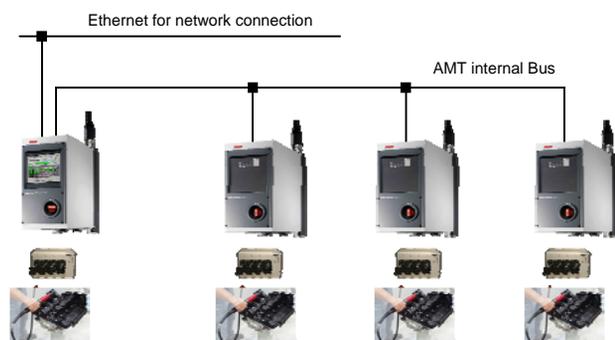
Integrated task management

When a single work station requires several nutrunning operations to be executed, the SMX30 offers the possibility to define up to 31 different nutrunning programs in one task plan. These can be carried out automatically or with guidance. The SMX30 counts and monitors whether all processes have been completed and creates a total quality assessment at the end. Task plans are stored either locally or uploaded from the SMX30 to your host computer.



Narrow
330x180x379
(HxBxT) in mm

Long
330x379x180
(HxBxT) in mm



*Nutrunner Control SMX30 Narrow
Single-Channel*

H 1.6.4

■ **Special Features – Technical Data**

Assembly

- Four assembly mounting holes in wall console
- IP54 protection

Display and Operator Controls

- 6.5" touch-screen display

Programming und Parameter Definition

- User-friendly programming software via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle control
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Interfaces

- 2 x Ethernet
- RS232, RS485
- USB
- Field bus systems available with expansion cards (optional)

Peripheral Equipment

- Operator console
- Socket tray
- Signalers (e.g., stacklight, alarm horn, etc.)
- I/O modules (parallel)
- Barcode reader, read/write devices (e.g., Moby E)

Number of Programs

- Max. 31

Spindle Types

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors



Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation, iTeleskop)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Integration in our RailNet system for wireless power supply and positioning of nutrunner control on assembly line
- Centralized parameter management

Nutrunner Control SMX30 Narrow Single-Channel

H 1.6.4

■ Overview Nutrunner Controls SMX30

Designation code:

SMX30 40ASH 02 EA

SMX = Designation nutrunner control generation

30 = Nutrunner control type

40A = Power class of output stage

SH = Internal designation

02 = Version number

EA = Parallel I/O interface

IBS = Interbus Slave interface

IBM = Interbus Master interface

PBS = Profibus Slave interface

DNS = Device Net Slave interface

WLAN = Integrated WLAN card

Further interfaces on request



Type	Dimensions control (HxWxD) in mm	Dimensions wall console (HxWxD) in mm	Total dimensions (HxWxD) in mm	Weight in kg	Ident-No.
SMX30 40ASH 02	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9939
SMX30 40ASH 02 EA	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9955
SMX30 40ASH 02 IBS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9956
SMX30 40ASH 02 IBM	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9957
SMX30 40ASH 02 PBS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9958
SMX30 40ASH 02 DNS	330x180x316	330x180x63	330x180x379	approx. 12,5	700 9959
SMX30 40ASH 02 WLAN	330x180x316	330x180x63	330x180x379	approx. 12,5	700 11606
SMX30 40ASH 02 EA WLAN	330x180x316	330x180x63	330x180x379	approx. 12,5	700 11607

*Nutrunner Control SMX30 Long
Single-Channel*

H 1.6.4

■ **Special Features – Technical Data**

General Information

The SMX30 cross configuration was designed especially for applications where there is limited installation depth available. This is, for example, typical of the automotive industry. The SMX30 cross configuration has a depth of only 180 mm and can, therefore, be easily integrated into your production line. Frequently, controls of this type are integrated in a traveling unit. This has the distinct advantage that the operator always has his nutrunner control in the vicinity.

Assembly

- Four assembly mounting holes in wall console
- IP54 protection

Display and Operator Controls

- 6.5" touch-screen display

Programming und Parameter Definition

- User-friendly programming software via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle control
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Interfaces

- 2 x Ethernet
- RS232, RS485
- USB
- Field bus systems available with expansion cards (optional)

Peripheral Equipment

- Operator console
- Socket tray
- Signalers
(e.g., stacklight, alarm horn, etc.)
- I/O modules (parallel)
- Barcode reader, read/write devices (e.g., Moby E)



Number of Programs

- Max. 31 per tool

Spindle Types

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors

Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation, iTeleskop)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Integration in our RailNet system for wireless power supply and positioning of nutrunner control on assembly line
- Centralized parameter management

Nutrunner Control SMX30 Long Single-Channel

H 1.6.4

■ Overview Nutrunner Controls SMX30

Designation code:

SMX30 40ALH 02 EA

SMX = Designation nutrunner control generation

30 = Nutrunner control type

40A = Power class of output stage

LH = Internal designation

02 = Version number

EA = Parallel I/O interface

IBS = Interbus Slave interface

IBM = Interbus Master interface

PBS = Profibus Slave interface

DNS = Device Net Slave interface

WLAN = Integrated WLAN card

Further interfaces on request



Type	Dimensions control (HxWxD) in mm	Dimensions wall console (HxWxD) in mm	Total dimensions (HxWxD) in mm	Weight in kg	Ident-No.
SMX30 40ALH 02	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11608
SMX30 40ALH 02 EA	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11609
SMX30 40ALH 02 IBS	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11610
SMX30 40ALH 02 IBM	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11611
SMX30 40ALH 02 PBS	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11612
SMX30 40ALH 02 DNS	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11613
SMX30 40ALH 02 WLAN	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11614
SMX30 40ALH 02 EA WLAN	330x316x180	330x63x180	330x379x180	approx. 12,5	700 11615

Nutrunner Control SMX30

H 1.6.4

Single-Channel

■ Options

For your information:

The following options are already included in the nutrunner control part number.

Parallel I/O board

PC104 slot

- Part No. 701 6617

The PC104 DIGIO16/16 is a digital I/O module. The 16 inputs and 16 outputs are designed for 24V operation and are isolated by an opto-electronic coupler (3kV). The digital outputs can be switched 24V/500mA (high-side) and are protected against overload and/or overheating.

Interbus board Slave

PC104 slot

- Part No. 701 7664

The slave communications interface in the InterBus network independently transfers data between the bus subscribers and the nutrunner control. The process image is held in dual-port memory and is, therefore, directly available to the application.

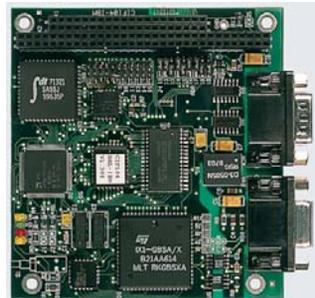


Interbus board Master

PC104 slot

- Part No. 701 7665

The master communications interface in the InterBus network independently transfers data between the bus subscribers and the nutrunner control. The process image is held in dual-port memory and is, therefore, directly available to the application.



Nutrunner Control SMX30

H 1.6.4

Single-Channel

■ Options

For your information:

The following options are already included in the nutrunner control part number.

Device Net Slave

Anybus slot

- Part No. 701 7908



The communications module provides optimized connection of our nutrunner control to an automation device. It is typically used where larger amounts of data need to be transferred at high speed. The DeviceNet module supports a bandwidth of max. 256 Byte input and 256 Byte output data, as well as all transfer rates from 125 - 500 Kbit/s. The module offers the complete functional range of a DeviceNet adapter for implicit and explicit messaging and supports UCMM. The DeviceNet interface is completely isolated galvanically. "Polled I/O", "bitstrobed I/O", "change of state" and "cyclic I/O" are all supported. In addition to the standard DeviceNet objects "identity", "message router", "DeviceNet", "assembly", "connection" and "acknowledge handler", the following manufacturer-specific objects are pre-defined: "I/O data input", "I/O data output", "diagnostic", "parameter input", and "parameter output". Two diagnostic LEDs signal the current DeviceNet status and any fault messages. The module is supplied with the mandatory 5-pin DeviceNet threaded terminal clamp.

PROFIBUS Slave

Anybus slot

- Part No. 701 7907



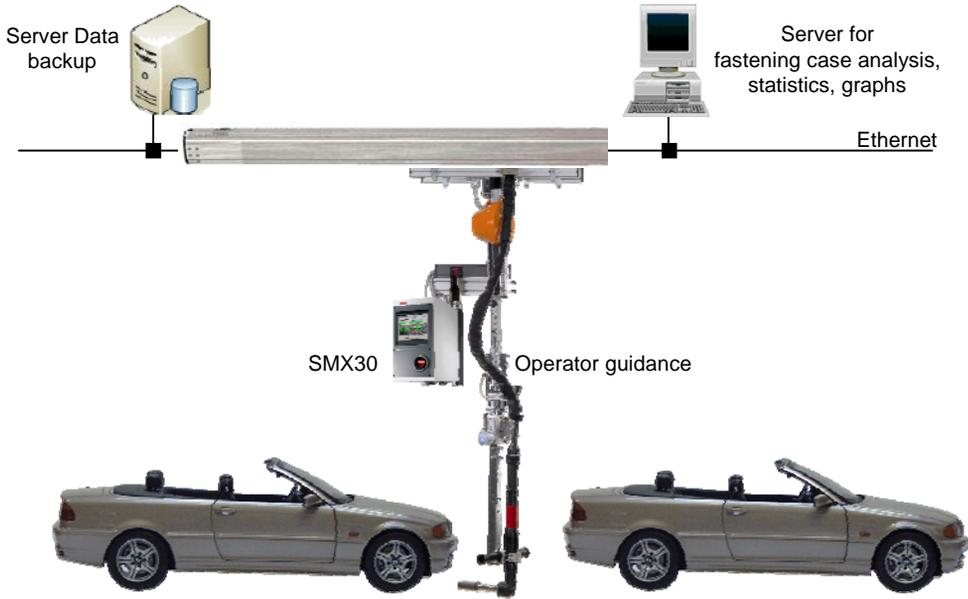
PROFIBUS (Process Field Bus) is a universal fieldbus which has broad application in manufacturing and process automation. PROFIBUS enables communication between our nutrunner control and your SPS without the need for special interface adaptation.

PROFIBUS is suitable for fast, time-critical applications, as well as complex communication tasks. The PROFIBUS Slave board contains bus access authorization, i.e. only received messages are acknowledged or, upon request from the Master, messages can be transmitted. The module supports a maximum PROFIBUS bandwidth of 244 Bytes for cyclic I/O data and additional acyclic data and diagnostic messages. The PROFIBUS transfer speed is recognized automatically in the range of 9.6 Kbit/s up to 12 Mbit/s. Two diagnostic LEDs signal the current DeviceNet status and any fault messages. The bus is connected by the mandatory 9-pin D-Sub jack.

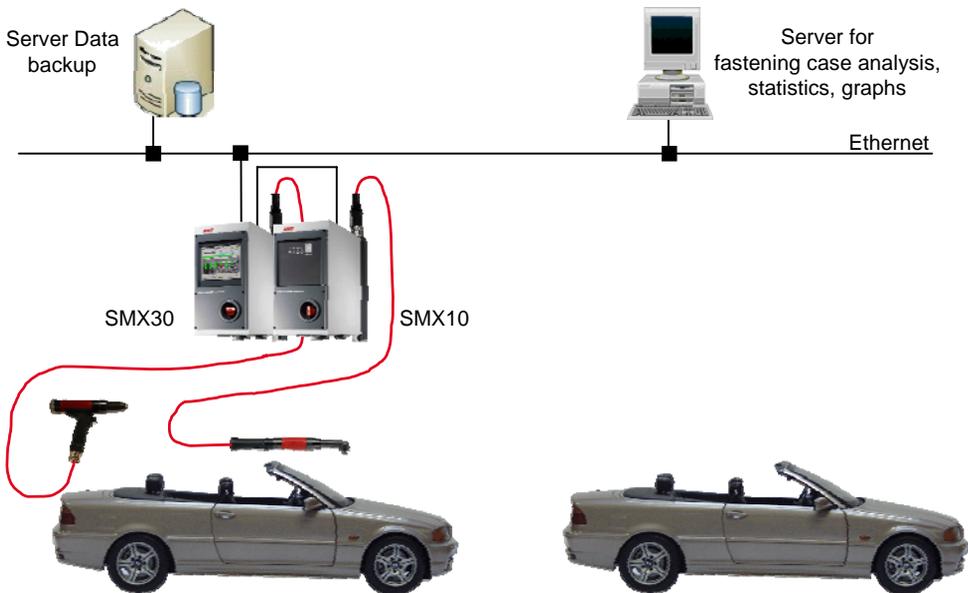
Nutrunner Control SMX30 Configuration Examples

H 1.6.4

■ *SMX30 connected to a telescope*



■ *Master- Slave configuration SMX30 / SMX10*



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Nutrunner Control SMXP

Single-Channel / Multi-Channel

H 1.6.5

■ General Information

High-End Nutrunner Control

The SMXP is our high-end nutrunner control that can take on other tasks in addition to the nutrunning process. For this purpose, the SMXP uses an efficient, industrial PC, including an operator panel with color monitor.

Programming Complex Nutrunning Sequences

The SMXP offers, as opposed to traditional nutrunner controls, the possibility of programming complex nutrunning sequences. All standard nutrunning processes that are based on torque and angle-based are available as program modules. These basic modules, as well as additional commands for process control, can be combined, with the aid of a user-friendly, parameter-driven interface, to form complex nutrunning sequences. Program branches can be written that are executed as a result of quality information, that, for example, allow loosening operations with or without repeated nutrunning.

Nutrunning Case Analyses

A user-friendly graphic interface is available for conducting nutrunning case analyses. Up to 999 nutrunning curves can be drawn and stored for evaluation at a later time. Graph activation occurs by date and time, as well as by inputting the number of desired nutrunning curves. The resulting nutrunning curve can be panned and zoomed in, as needed. For further analysis, it is possible to overlay up to 99 nutrunning curves, where the intersection of each curve can be positioned on the threshold torque.

Automatic Tool ID

Handheld nutrunners from AMT are equipped with a data storage feature, in which all tool-related parameters can be stored. When a tool is connected to the SMXP, these parameters are automatically retrieved and can be compared with nominal data stored in the control. If the data do not match, then the tool will not be accepted by the control and a fault message will be generated. Acceptance of new data and start of operation can only occur in this case if the data is confirmed by manual intervention.

Integrated work plan management for multiple nutrunner channels (nutrunner controls)

For multiple fastening operations with different tools at a single work station, the SMXP offers the ability to define up to 31 different fastening programs per tool in a work plan. These can then be executed in free-style or guided operation. The SMXP counts and monitors whether all fastening operations have been completed and creates a total quality evaluation on the end of the process. Work plans are either stored locally or transferred from a customer-provided host computer.



SMXP
Single-channel



SMXP twin
Multi-channel



SMXP Multi-channel
1-10 channel

Nutrunner Control SMXP Single-Channel / Multi-Channel

H 1.6.5

■ General Information

Nutrunner Data Management

The SMXP stores nutrunner data on the local hard drive to monitor the quality of the nutrunning process. Integrated statistical functions allow evaluation of the stored torque and angle values with specification of the actual cm- and cmk-values. If desired, the data can be stored for up to 12 months on the hard drive. The data can also be exported into an Excel spreadsheet file.

Access Restriction by User Groups

A key factor in securing the nutrunning process is the protection of the nutrunner control from unauthorized access. Frequently, only a limited number of employees are allowed to modify the nutrunning parameters. The SMXP is capable of managing an access hierarchy with up to 5 user groups. Authorization is password-protected.

Enhanced Process Control

The SMXP is often used for quality-critical nutrunning applications, where the fastening process is accompanied by additional process control measures. One example for this would be the recognition of nutrunning locations by ultrasonic triangulation.

It is possible with this process to have an automatic correlation between the tightening parameters and the actual values for each fastener. The software required for this is simply installed on the integrated PC.

Ask us about more process control possibilities!

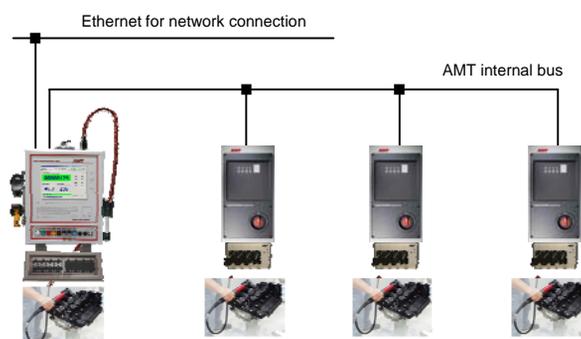
Multi-Channel Configuration

The capabilities of the SMXP allow the configuration of multi-channel controls in a master/slave environment. Up to 9 additional nutrunner controls can be connected to an SMXP, which serves as the master control.

The following configurations are possible:

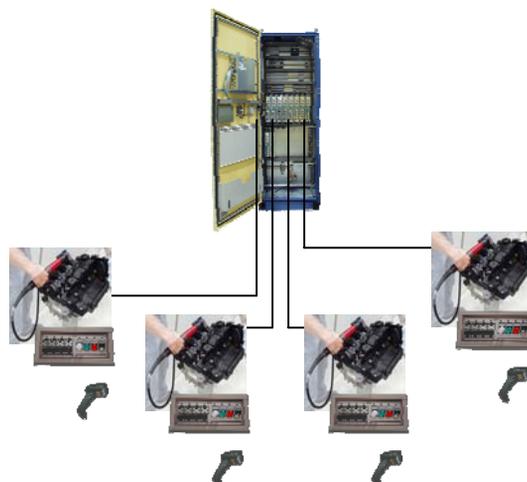
Decentralized Configuration

The SMX10 controls required for this, consisting of a housing with integrated nutrunner module, are connected to the SMXP master via data bus and installed directly at each workstation.



Centralized Configuration

Master PC and graphic display unit, as well as up to 10 nutrunner modules, are installed in a control cabinet. As required, the control cabinet can then be either positioned near the workstation area or on a control cabinet platform.



Nutrunner Control SMXP
Single-Channel

H 1.6.5

■ **Special Features – Technical Data**

General

- Pentium processor
- Operating system: Windows XP Professional
- 8 GB hard drive and 3.5"/1.44 MB floppy disk drives
- 10/100 Mbit Ethernet interface, RJ45 network connector (e.g. for programming, nutrunner data transfer, etc.)
- Serial interface (e.g. for ID system, barcode reader, label printer, etc.)
- LPT1 printer interface
- USB printer interface
- USB interface for data backup



Assembly / Dimensions

- Mounting: bracket for wall / ceiling or mounting on support element
- Dimensions: 630mm x 510mm x 260mm (HxWxD)
- Protection: IP54

Display and Operator Controls

- TFT 15" color monitor
- Full keyboard with mouse

Programming and Parameterization

- Integrated operator and parameter interface
- Via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle control
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Periphery

- Operator control
- Socket box
- Indicators (e.g. lights, horn, sector division, etc.)
- Signal exchange with SPS:
 - I/O modules (parallel)
 - Field bus (e.g. Profibus, Interbus, DeviceNet, etc.)
- Barcode reader, data media (e.g. Moby E)

Number of Programs

- Max. 31 per tool (depends on the selection)

Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Integration in our RailNet system for wireless power supply and positioning of nutrunner control on assembly line
- Centralized parameter management

Power Supply

- SMXP single-channel housing: 230V / 50Hz

Compatible Nutrunner Models

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors, as long as emergency stop is not required

Type	Dimensions (HxWxD) in mm	Weight in kg	Ident-No.
Nutrunner control SMXP	630x510x260	approx. 40	on request

Nutrunner Control SMXP Multi-Channel

H 1.6.5

■ Special Features – Technical Data

General

- Pentium processor
- Operating system: Windows XP Professional
- 8 GB hard drive and 3.5"/1.44 MB floppy disk drives
- 10/100 Mbit Ethernet interface, RJ45 network connector (e.g. for programming, nutrunner data transfer, etc.)
- Serial interface (e.g. for ID system, barcode reader, label printer, etc.)
- LPT1 printer interface
- USB printer interface
- USB interface for data backup

Assembly / Dimensions

- Mounting: bracket for wall / ceiling or mounting on support element
- Dimensions: 630mm x 510mm x 415mm (HxWxD)
- Protection: IP54

Display and Operator Controls

- TFT 15" color monitor
- Full keyboard with mouse

Programming and Parameterization

- Integrated operator and parameter interface
- Via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle control
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Periphery

- Operator control
- Socket box
- Indicators (e.g. lights, horn, sector division, etc.)
- Signal exchange with SPS:
 - I/O modules (parallel)
 - Field bus (e.g. Profibus, Interbus, DeviceNet, etc.)
- Barcode reader, data media (e.g. Moby E)



Number of Programs

- Max. 31 per tool (depends on the selection)

Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Integration in our RailNet system for wireless power supply and positioning of nutrunner control on assembly line
- Centralized parameter management

Power Supply

- SMXP multi-channel housing: 230V / 50Hz

Compatible Nutrunner Models

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors, as long as emergency stop is not required

Type	Dimensions (HxWxD) in mm	Weight in kg	Ident-No.
Nutrunner control SMXP twin	630x510x415	approx. 60	on request

Nutrunner Control SMXP Multi-Channel

H 1.6.5

1-10 channel

■ Special Features – Technical Data

General

- Pentium processor
- Operating system: Windows XP Professional
- 8 GB hard drive and 3.5"/1.44 MB floppy disk drives
- 10/100 Mbit Ethernet interface, RJ45 network connector (e.g. for programming, nutrunner data transfer, etc.)
- Serial interface (e.g. for ID system, barcode reader, label printer, etc.)
- LPT1 printer interface
- USB printer interface
- USB interface for data backup

Assembly / Dimensions

- Dimensions : 2200mm x 800mm x 600mm (HxWxD)
- Protection: IP54

Display and Operator Controls

- TFT 15" color monitor
- Full keyboard with mouse

Programming and Parameterization

- Integrated operator and parameter interface
- Via network

Nutrunning Processes

- Torque-controlled tightening
- Torque-controlled with angle monitor
- Angle-controlled with torque monitor
- Yield-controlled tightening
- Angle-controlled and torque-controlled loosening
- Shutdown based on digital signal with torque and angle control
- Friction measurement
- Retrospective nutrunning monitor
- Redundant motor current control
- Nutrunning time monitor

Periphery

- Operator control
- Socket box
- Indicators (e.g. lights, horn, sector division, etc.)
- Signal exchange with SPS:
 - I/O modules (parallel)
 - Field bus (e.g. Profibus, Interbus, DeviceNet, etc.)
- Barcode reader, data media (e.g. Moby E)



Number of Programs

- Max. 31 per tool (depends on the selection)

Enhanced Functions

- Part-based OK / fault information using counter function (available for multiple programs)
- Interface to part-based nominal data defaults from host computer
- Tightening data transfer to higher level systems
- Tightening location recognition (e.g. by ultrasound triangulation)
- Load-dependent maintenance management for carrying out preventive maintenance on handheld tools
- Centralized parameter management

Power Supply

- Control cabinet SMXP multi-channel: 400V / 50 Hz; 3-Phases, N, PE

Compatible Nutrunner Models

- Hand tools from HCR, HCRK, PCR, HCX and PCX series with reaction torque sensors or action torque sensors
- Built-in tools from ECR1 and ECR2 series with reaction torque sensors or action torque sensors

Type	Dimensions (HxWxD) in mm	Weight in kg	Ident-No.
Nutrunner control SMXP multi-channel	2200x800x600	depending of the amount of channels	on request

Nutrunner Control SMXP Configuration Examples

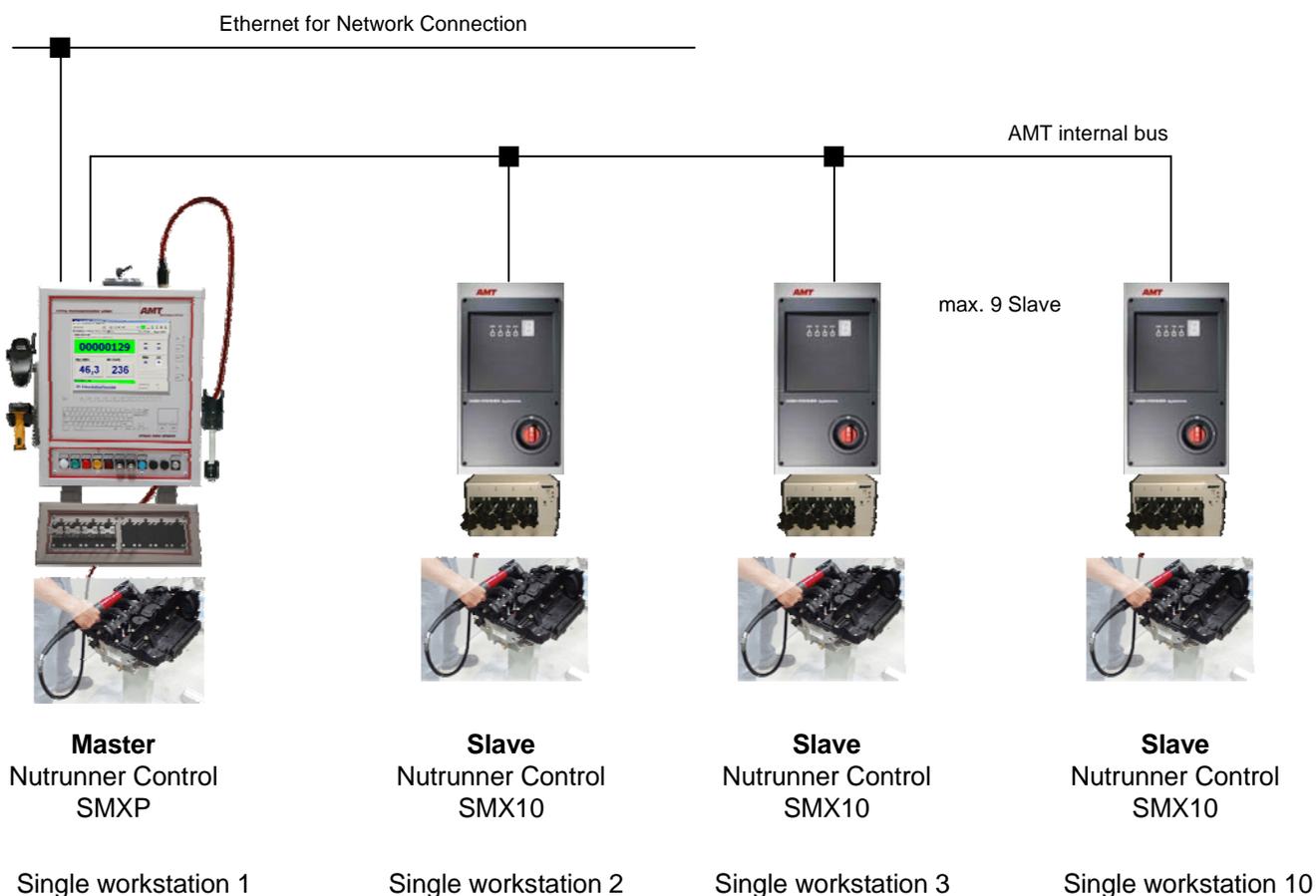
H 1.6.5

■ Master - Slave Configuration

Decentralized Configuration

The SMXP nutrunner control assumes the master function, i.e. it coordinates the SMX10 nutrunner control systems and provides the external interface.

Parameterization and graphic display take place in the SMXP nutrunner control or via the network.



*Nutrunner Control SMXP Multi-Channel
Configuration Examples*

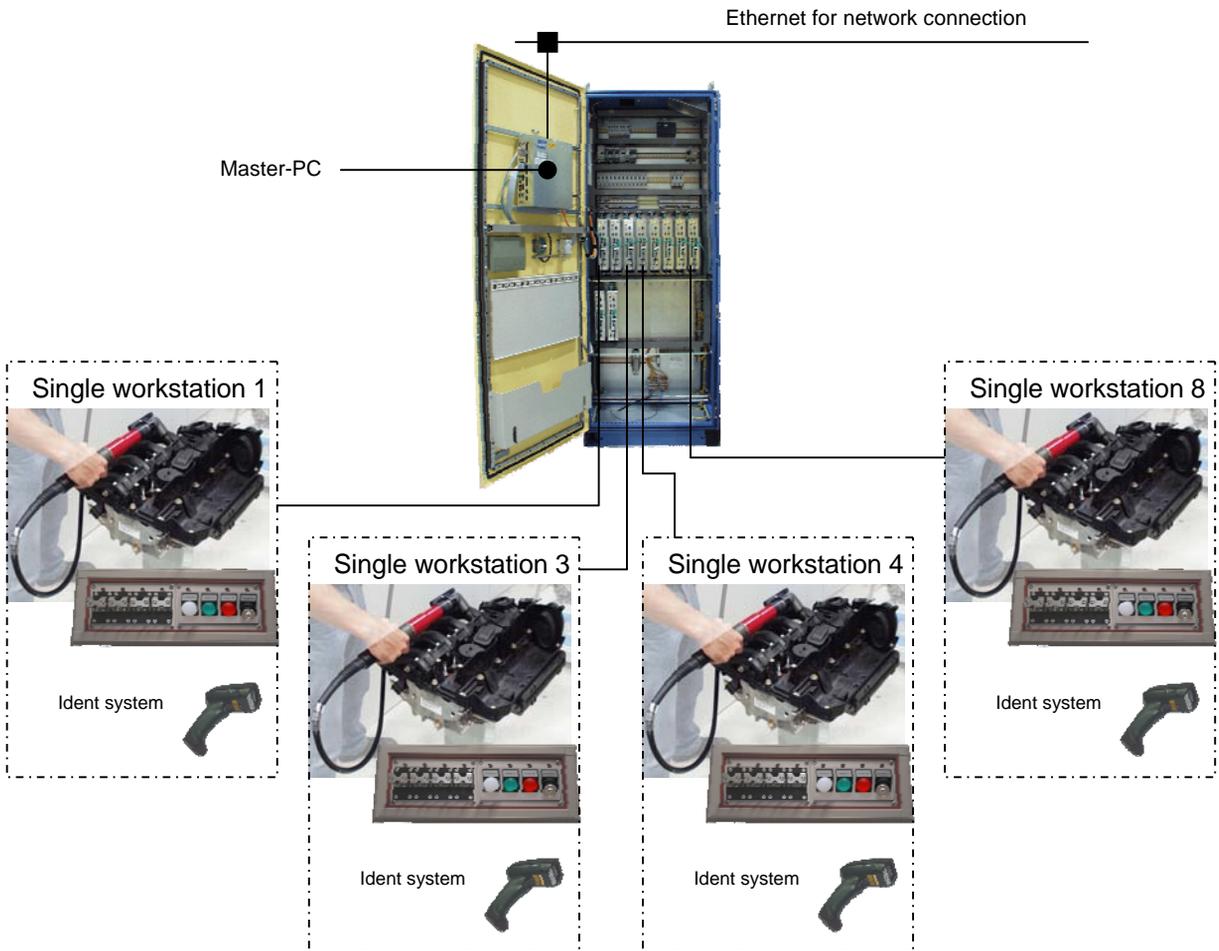
H 1.6.5

■ **Master - Slave Configuration in Combined Control Cabinet**

Centralized Configuration

The master PC coordinates individual tightening modules (workstations) and provides the external interface.

Up to 10 individual workstations can be controlled, managed, and receive parameters from one master PC.



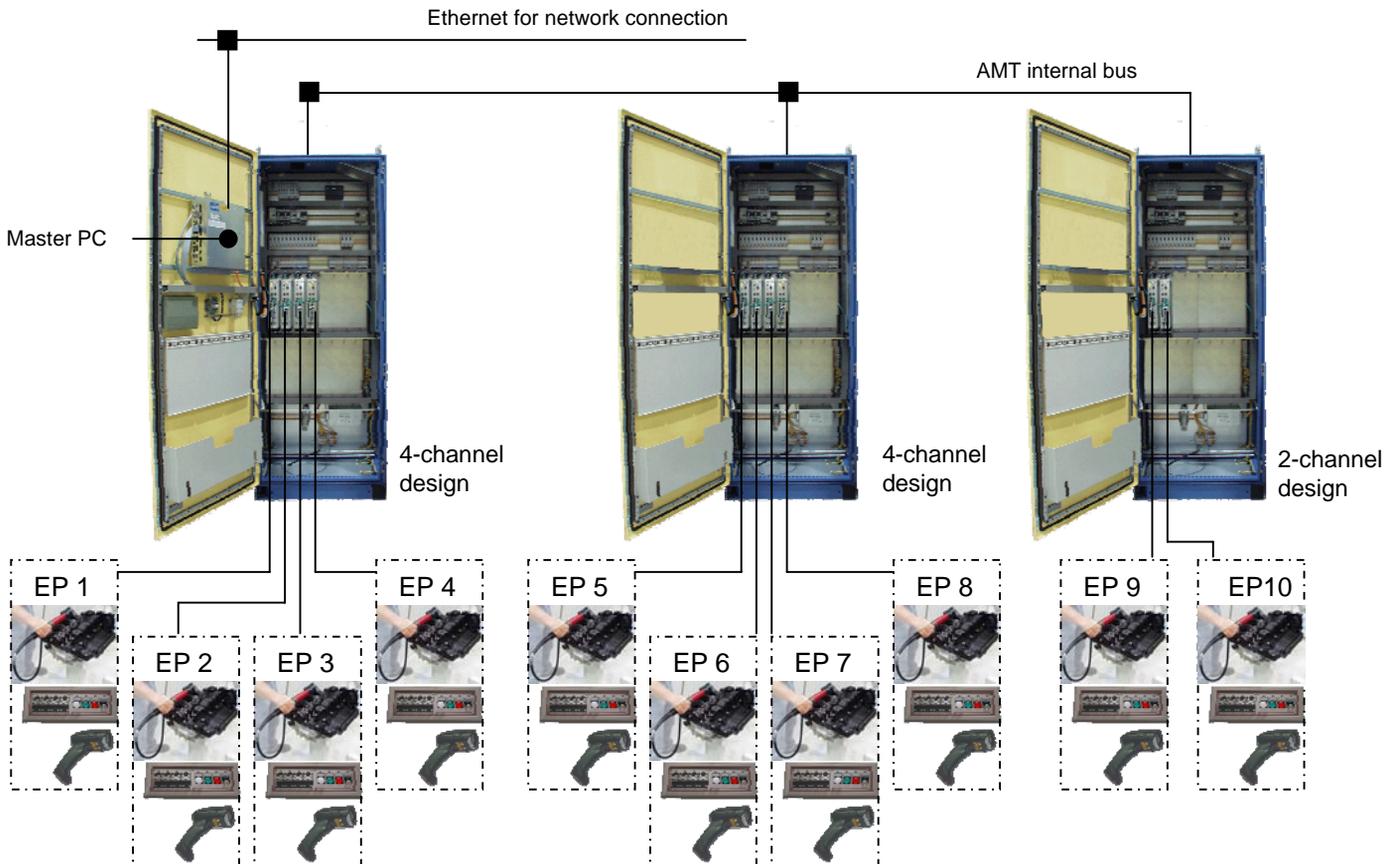
Nutrunner Control SMXP Multi-Channel Configuration Examples

H 1.6.5

■ Master - Slave Configuration Distributed over 3 Control Cabinets

The master PC coordinates individual tightening modules (workstations) and provides the external interface.

Up to 10 individual workstations can be controlled, managed, and receive parameters from one master PC.



Process Safety

H 1.7

■ General Information

Are you sure your saved tightening data has been generated at the correct tightening points?

Our Ultrasonic Triangulation, iTeleskop, and RailNet process validation systems are available for all handheld or hand-guided tools. These apply to engine, transmission, or automobile assembly environments, whether in assembly line or fixed cycle production. We store the fastening locations and are able to use these to validate your process.

What are the risks if you work without process validation?

- Fastening operations can be overlooked
- Tightening sequences may not be followed correctly
- Pre-defined torques can be overlooked
- Correctly tightened fasteners can be loosened
- Fastening data can be allocated incorrectly

What are the risks for you and your organization?

- Costly errors that require rework or correction in the field (at customer site)
- Series problems during mass production can threaten your existence
- Products affected cannot be identified, wide range in recalls result in exploding costs
- Criminal consequences, in addition to damage and liability risks
- Damage to image

What can we do for you?

Our process validation systems allow you to locate the exact position of the nutrunner tool in space.

By calculating the X-, Y-, and Z-coordinates, it is possible to store fastening locations, pre-define operation sequences, check positions, and reliably allocate fastening results. The position records allow you to document the work based on fastening location, part, or vehicle. This is an effective way to address product liability problems. You protect the quality of your product, safeguarding its success.

The most important features of this system

- Can be used in line production and in fixed cycle production
- Setting of processing sequences
- Reduction of processing time by automatic parameter selection / change-over
- Increase in process safety by automatic activation of the correct tightening parameters
- Safe allocation of the tightening data to the tightening point, component or vehicle
- No socket selection necessary - therefore cost saving
- Process safety by identifying incorrect tightening operations and by the targeted loosening of the corresponding tightening operation
- Process safety by generating a total OK statement after all tightening operations have been carried out in the correct sequence

Advantages for your organization

- Potential savings in rework and test costs
- Reduced risk of product recalls
- Potential savings in warranty and good will costs
- Reduced scrap costs

Process Safety Ultrasonic Triangulation

H 1.7.1

■ General Information

The fascination of new possibilities led to the development of our 2nd generation Ultrasonic Triangulation. Tool ergonomics and design were improved considerably, while reducing the weight at the same time. Ultrasonic Triangulation offers you the ability to capture the exact position of the nutrunner in space.

Functioning

The operator actuates the start button at the handheld tool, an ultrasonic sender at the angle head of the handheld tool sends acoustic pulses to the ultrasonic receiver. The distance to the receivers is determined by the runtime of the acoustic pulses. The relative position is determined by angle relations in the triangle (triangulation). When the coordinates of the tightening point match the coordinates in the data base, the processing operation will be released. The correct tightening program will be automatically selected and processed. On completion of the tightening operation, the tightening data will be allocated to the particular tightening point and the component or vehicle. The nutrunner control system will issue a total evaluation on completion of the work content.

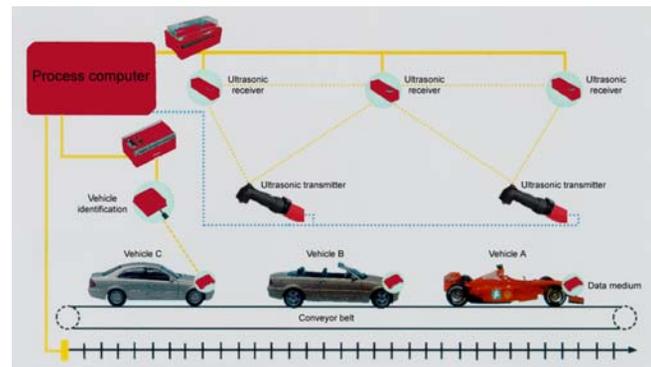
The most important features of this system

- Can be used in line production and in fixed cycle production
- Setting of processing sequences
- Reduction of processing time by automatic parameter selection / change-over
- Increase in process safety by automatic activation of the correct tightening parameters
- Safe allocation of the tightening data to the tightening point, component or vehicle
- No socket selection necessary - therefore cost saving
- Process safety by identifying incorrect tightening operations and by the targeted loosening of the corresponding tightening operation
- Process safety by generating a total OK statement after all tightening operations have been carried out in the correct sequence

Process safety – Quality – Success

More detailed information about these systems can be found in the appropriate product flyers. You can obtain these at <http://amt.alfing.de/de/support/download-area/>

■ Schematic diagram



Ultrasonic transmitter

X = 1500

Y = 1168

Z = 2348



Process Safety iTeleskop - the intelligent telescope

H 1.7.2

■ General Information

With its modular system, the intelligent Telescope can be closely adapted to your requirements. It doesn't matter whether you're working with a single nutrunner, multi-nutrunners, riveting pistols, or grippers. The iTeleskop offers unlimited application opportunities.

Whether installing a new work station or moving an existing station, this can be accomplished in only a few steps, resulting in reduced cost to you.

Up to 5 axes can be captured with the iTeleskop. This provides you with documentation for an operation related to location, part, or vehicle.

This is your chance to efficiently confront product liability problems. By doing this, you protect the quality and success of your product.

In connection with our Rail-Net Assembly System, the iTeleskop can be configured for wireless operation. This provides almost unlimited opportunities for the iTeleskop work area.

A changeover within your assembly line is now possible at low cost. The synergistic effects are enormous with great potential savings to you.

Mode of operation:

The operator presses the START button on the nutrunner. All linked path measuring systems are retrieved from the nutrunner control over the serial interface.

The SMX30 nutrunner controller calculates the position of the fastening location, based on up to 5 positions. If this position agrees with the next fastening location to be run down, the nutrunner is released and automatically executes the designated program. The operator can view the progress of this process at any time on the nutrunner control monitor, where the information is continuously updated. Operational sequences, with or without compulsory guide, can be completed without problems or errors.



iTeleskop Features:

- Available for all common commercial rail systems
- Any fastening position can be reached by an optional, custom rotating and pivoting device
- Torque configurations available up to 1200 Nm
- Integrated absolute position sensor systems:
 - Fastening position determination
 - Unrestricted work area definition with warning limits, thereby eliminating need for scanners, proximity switches, intermediate switches, etc.
 - Allocation of task definition
- Predefined operation sequences
- Process time reduction with automatic parameter selection / changeover
- Increased process reliability with automatic activation of correct fastening parameters
- Cost savings through reduced socket selectors
- Process-reliable allocation of fastening data to fastening location, part, vehicle

Process safety – Quality – Success

More detailed information about these systems can be found in the appropriate product flyers. You can obtain these at <http://amt.alfing.de/de/support/download-area/>

Process Safety Rail-Net Assembly System

H 1.7.3

■ General Information

Our patented Rail-Net Assembly System allows you to configure assembly lines with wireless capabilities in order to link flexible nutrunner technology into the assembly lines and to validate the process. System advantages include low net weight, high load-bearing and warp resistance, as well as free and easy carriage movement, capable of bearing considerably higher loads than other commercially available track systems. This system allows you to economically configure nutrunner assembly lines. Nutrunner controls are easily added, removed, or cycled through. The integration of an absolute measuring system and additional capture of bandwidth allows error-free allocation of process data to vehicles. User-defined work areas and task assignments can be set and classified using the operator software. This provides maximum flexibility for process sequences on vehicles within the work area, with simultaneous, error-free allocation of fastening data.

Advantages:

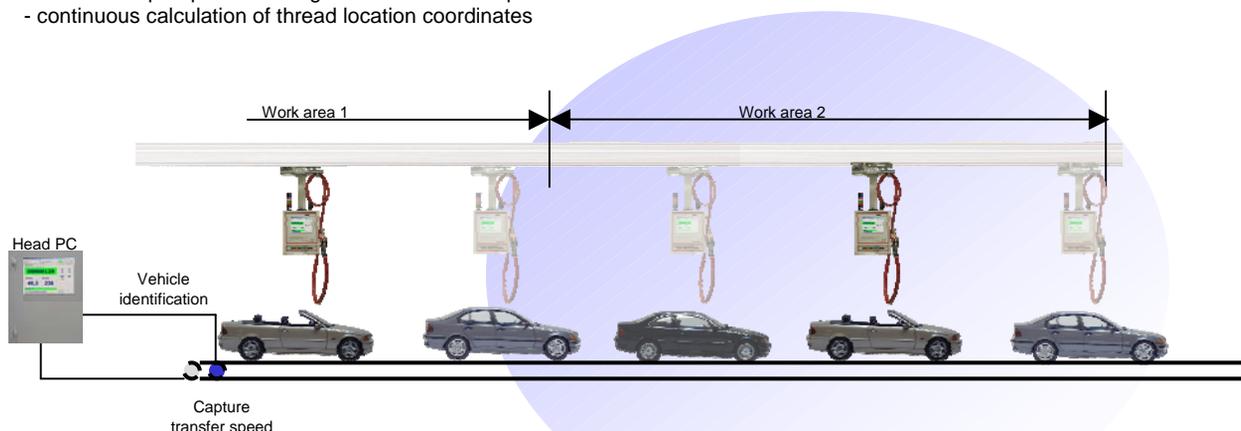
- user-defined warning limits
- user-defined allocation of task assignments
- elimination of scanners, reader locations, proximity and intermediate switches
- rapid cycle expansion
- link with 3rd party equipment (e.g. Oetiker clamps)
- user-defined work area definition (less conveyor stops, less rework)
- elimination of idle time until vehicle has entered cycle
- handling devices can be moved simultaneously with flow speed (use of toothed belts)
- reduced number of nutrunner controls
- faster fault correction
- reliable allocation of fastening data

Important features:

- Enclosed guide rails
- Elimination of cable track assembly
- Nutrunner positioning with wireless power supply
- Wireless Ethernet network interface
 - data transfer between host computer, nutrunner data server and nutrunner control
- Integrated absolute encoder
 - determines position of nutrunner control
 - determines work areas with warning limits
 - assigns work content
- Reliable assignment of nutrunner data
 - determines part position using recorded transfer speed
 - continuous calculation of thread location coordinates

Process safety – Quality – Success

More detailed information about these systems can be found in the appropriate product flyers. You can obtain these at <http://amt.alfing.de/de/support/download-area/>



Customer Service

H 1.8

■ **Training and Service**

AMT offers a comprehensive program of services which are tailored specifically to the various product lines we offer. Take advantage of our expertise to optimize your production and save time and money.

Personalized Orientation and Training

Our specialists train your staff and prepare you for optimal use of our products. Whether on-site at the machine or in our well-equipped training center – we tailor the training program specifically to your requests and requirements.

Your advantages:

- Targeted know-how, matched to your requirements
- Smooth production with the aid of trained personnel

Production Support

You plan a steep and smooth production ramp-up, but your staff is not yet completely familiar with the new or existing systems? No problem! Rely on our experts and allow us to help you. We can support your staff "on the job". And we will continue to do this until you are confident that you no longer need us.

Service

AMT's service is focused on fast response times and non-bureaucratic assistance, in order to ensure the rapid and reliable return of your systems to production capability. This is made possible either with telephone support on our Service Hotline or by a professional on-site visit from one of our service technicians.



■ **Maintenance and Planning**

Maintenance Contracts

Nutrunners are subject to natural wear over time and should be maintained, based on a signal from the load-dependent maintenance counter. AMT, therefore, offers individually formulated maintenance contracts, according to which we can maintain your nutrunners at a fixed price.

Your advantages:

- Preventive maintenance dramatically reduces down-time
- Predictable cost-planning with fixed rate
- Reduced workload for your personnel

Reconditioning and Retooling

Have your systems reached the age where problems are occurring more frequently? Have your required production yields increased? Are new products scheduled to run on these systems?

We have the right answer for all of these questions. Our specialists are happy to support you with advice and actions to solve your problems. We are able to offer a variety of solutions and individualized support services. And if there is limited time available for the required work, this, too will not be a problem. We also work nights and weekends – for you!

Planning Support

Do you have large projects in-house but not enough personnel to support the required planning activities? Our qualified personnel are happy to support you in the completion of these tasks. We can send AMT-personnel to your organization for a specified period of time.

Your advantages:

- Short-term available expertise
- Reduced workload for your personnel
- No increase in personnel required for time-limited projects

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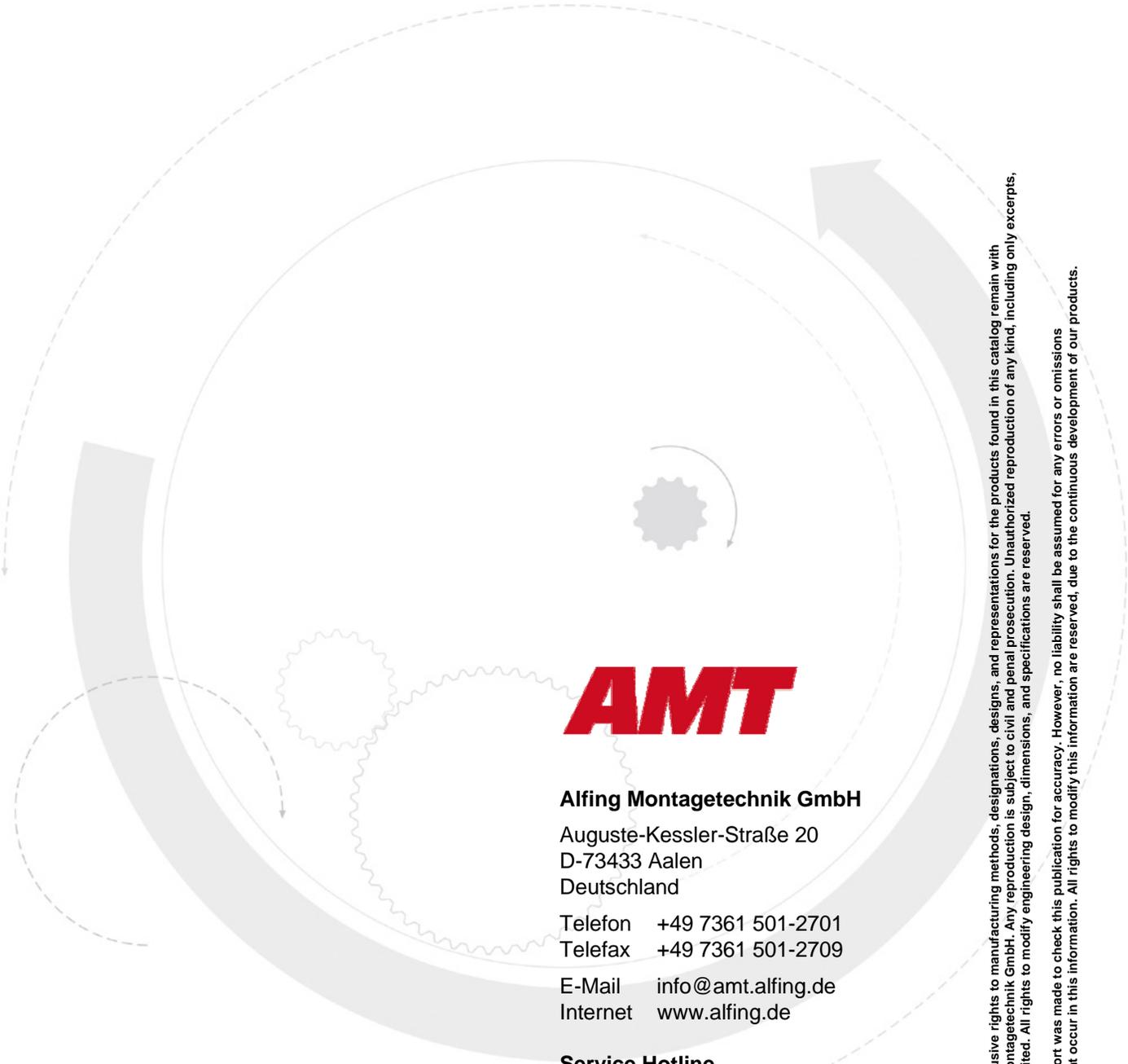
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