Tightening automation.
Only excellent solutions.

MCB: high technology electric nutrunner motors

Fiam®

PEOPLE AND SOLUTIONS

MCB: high technology electric nutrunner motors

Extensive range of solutions to ensure the final quality of the product

The quality of any product is the result of many complex corporate activities which are also including the production process.
Assembly operations, and most of all the ones foreseeing the use of screws (nuts, bolts, etc.) are of utmost importance to **guarantee the final quality of a product**.

This is particularly true as much as the fastening operation is a "critical" one as it is the case when there is **the need to guarantee the safety** of the working cycle (brake systems for motor vehicles for example), **service life and performance** (head fixing of explosion engines for example), **according to international norms and extreme precision in assembly operations**.
Under these conditions **the fastening cycle is of the utmost importance and has to be carried out by using the suitable technics and instruments**.

Fiam has planned and manufactured a **wide range of solutions** as summarized below by listening to customers' needs directly, particularly to the requirements of assembly and quality assurance department managers as well as of equipment and automation lines manufacturers.

Customer Service

- Analysis of pre-sale requirements
- Professional and thorough valuation of any technical-application need
- Technical advice for the planning of the finished product in order to facilitate the production process
- Assistance on how to optimize costs/benefits of operating costs during production process
- Testing certificate of the instruments
- Control/calibration service of assembly systems in the client's production sites

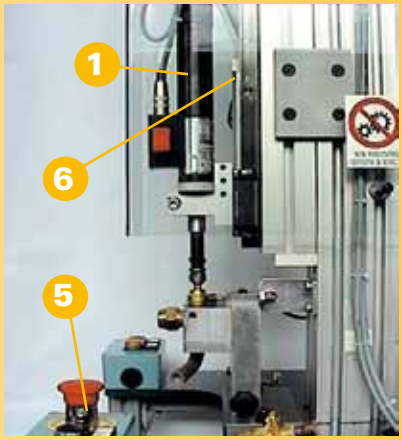
Pallets automatic line to fasten the screws on thermo-hydraulic collectors

Workstation for the tightening/un-tightening of industrial valves

Operating configurations

Tightening solutions comprise:
1. **Electric nutrunner motor**
   with indirect or direct computerized torque control
2. **Driver**
   to feed the motor and supply correct voltage and current parameters
3. **Computerized control unit**
   is checking and monitoring the assembly cycle
4. **Kit of cables**
5. **Start lever (or start button)**
6. **Arm (or fastening slide)**

Motors and units are connected to a kit of cables (4)



Current control electric nutrunner motors

up to 90 Nm

15MCB...C

Controller and feeding unit TCS-B

15MCB...C
17MCB...C
47MCB...C

Driver TOD...

Control unit TOC...

Electric nutrunner motors with torque and angle control

up to 90 Nm

15MCB...A
17MCB...A
47MCB...A

Driver TOD...

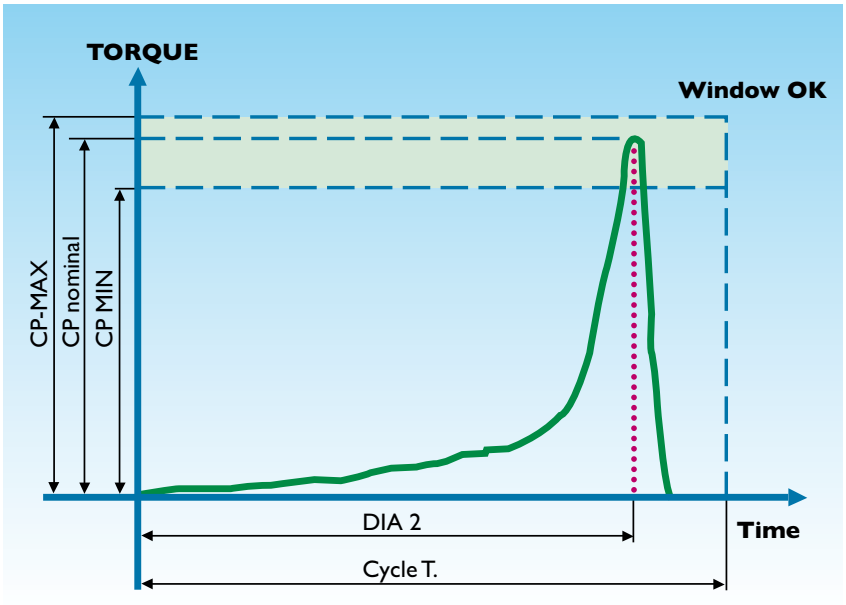
Control unit TOC...

Control strategies of the tightening process

In the industrial tightening process we different tightening requirements needing different control modalities are found. For example, the **torque control with the angle monitoring, the angle control with the torque monitoring, only torque control** and other types of control.
Fiam control units are equipped with a software to manage 4 basic strategies.

The tightening torque control

The main parameter to be controlled is the **tightening torque applied to the screw**. The motor stops automatically when the pre-set torque value (CP) has been reached.
If the torque and time values found by the system are within the programmed limits, the warning of OK cycle (green led turned on) is given.

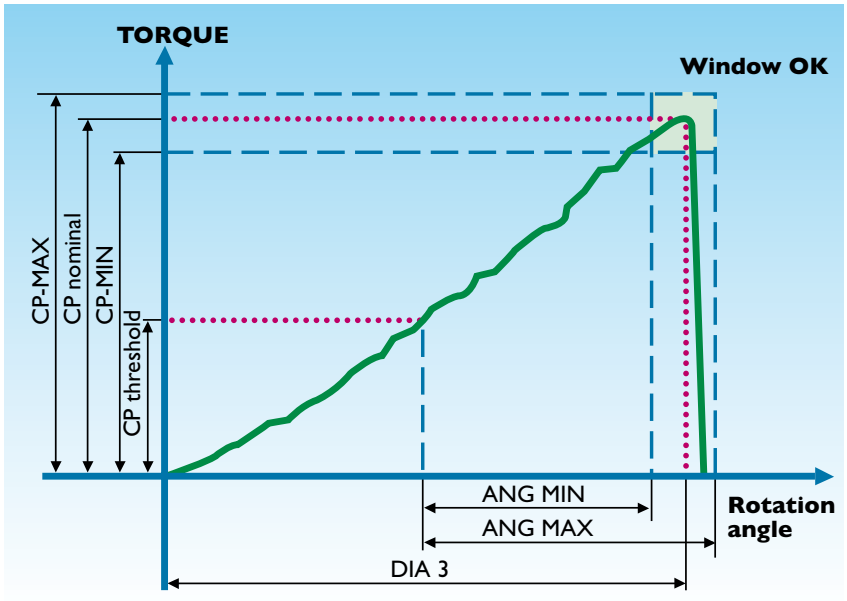


Advantages
Accurate control of the torque values in the very soft joints

Applications
Tightening between sheet metal and sheet metal (motor vehicle and household appliance fields) and tightening with the use of rubber joints (or similar)

The torque/angle control

The main parameters to be controlled are the **tightening torque applied to the screw and the rotation angle of the screw, with priority to the torque value**. The motor stops automatically when the pre-set torque value (CP) has been reached. If the torque and angle values found by the system are within the programmed limits, the motor stops automatically and the warning of OK cycle (green led turned on) is given.

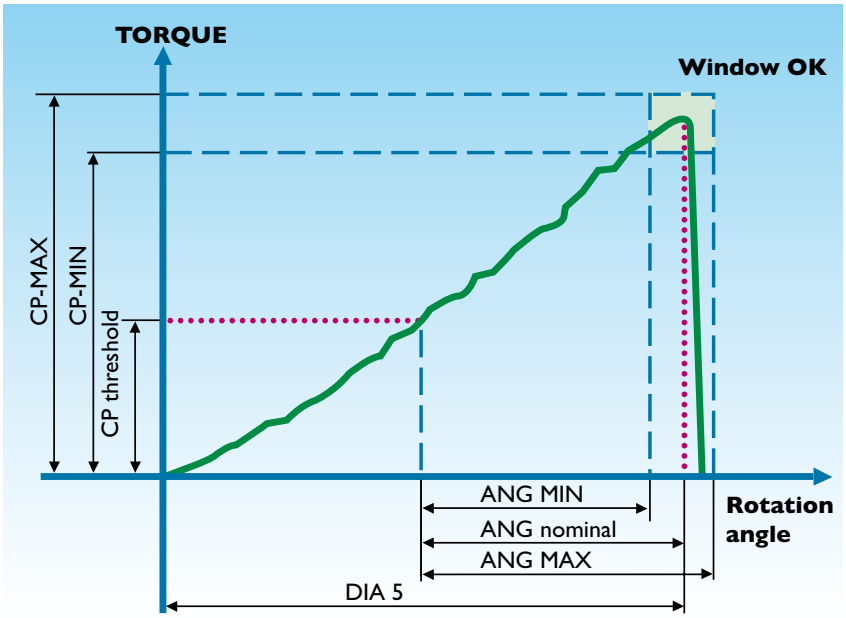


Advantages
Maximum control of the torque and certainty of a perfect joint through the angle surveys

Applications
Fixing seat belts, connecting rods of motors, drive shafts, brakes, wheels etc.

The angle/torque control

The main parameters to be controlled are the **tightening torque applied to the screw and the rotation angle of the screw, with priority to the torque value**. The motor stops automatically when the pre-set angle value (AP) has been reached.
If the torque/angle values found by system are within the programmed limits, the motor stops automatically and the warning of OK cycle (green led turned on) is given.

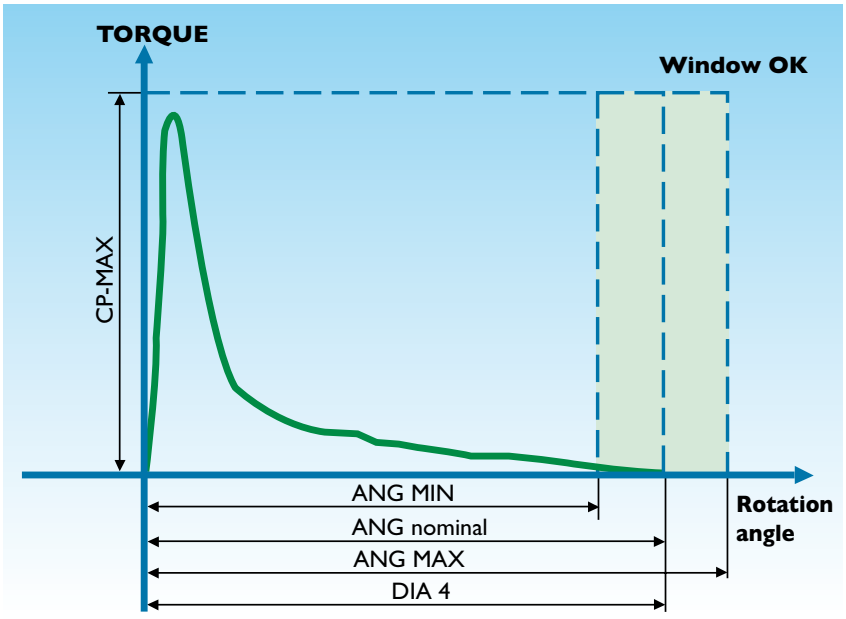


Advantages
Accurate control of the quality of the assembled product through the angle and torque values with tightenings at yield point; it is possible to assemble bolts, with lower weight, dimensions and diameter, obtaining a lighter assembled product

Applications
Connecting rods of motors, motor head, etc

Untightening control

The main parameter to be controlled is the **left rotation angle of the screw**. The motor stops automatically when the pre-set angle value (AP) has been reached.
If the angle values found by system are within the programmed limits, the motor stops automatically and the warning of OK cycle (green led turned on) is given.



Advantages
Resumption of the tightening after the adjustment of the materials

Applications
Everywhere it is necessary to untighten workpieces

Current control electric nutrunner motors

Thanks to their modularity, compactness and versatility, these electric nutrunner motors are able to **solve many tightening needs, also very complex**.
They are particularly suitable for use in multispindle units for fastening operations where more screws are fastened simultaneously and when it is important to guarantee the final quality of the product. (e.g. motorvehicle brake systems head of a piston engine, cover tap of a water heater, etc.).

These motors with the feed and the control units, **guarantee the maximum quality of tightening process** thanks to indirect torque/angle control where the parameters are achieved by measuring the current absorbed by the brushless motor and by appropriate sensors.

17MCB30C1

Reliability

Long lifetime of the components thanks to careful design and to quality of the productive process which results in less maintenance and repair costs

These motors are powered by a driver and computerised control unit, which are programmable according to customer's needs, ensuring control of the fastening parameters (torque, angle, speed), and it is possible to **view, print, store and collect statistical data**

Some moldels (highlighted in the chart on page 8) are equipped with a **built-in angle transducer (resolver)** that guarantees an elevated resolution in the angle measurement and the therefore it assures an **excellent tightening process control**

They offer **superior quality standards with reduced operating costs** thanks to their simple manufacturing concept when compared to the matching models with torque/angle built-in transducer

These motors ensure **consistent fastening accuracy** by a suitable programming of the control unit which allows a high torque repeatability and reduced torque scattering

They are particularly effective in ISO 9000 environments

Don't be satisfied with the maximum

Perfection for your solutions

Naturally innovative

Productivity Ergonomics Ecology

Considerable increase of the efficiency, of the tightening cycle thanks to innovative design concept

They are mainly used in multispindle units for fastening operations with one or more spindle. These motors ensure a combination of high quality and increased productivity in the fastening process, since **more screws are fastened simultaneously under the same time-cycle conditions** (e.g. of the head of a piston engine, to a tap cover of a water heater, etc.)

Considerable reduction of the productive times: **there is no need of post-process as extremely precise fastening is guaranteed**

Optimization of performances in regard to ergonomics and operator safety in working environments

They meet the most important ergonomic requirements such as **low noise level** and **maximum safety** (thanks to the low electric voltage); so they guarantee comfortable working environments to the operators

Innovative systems designed paying even more attention with respect to environment and its safeguard

They **safeguard the working environment** from the presence of environmental pollution caused by the oil exhaust of the compressed air

All the components are **easy to dispose of** because they are built using recyclable materials

All Fiam products are supplied **eco-friendly packaging**

15MCB10C1

17MCB35...

Current control electric nutrunner motors
up to 90 Nm

Model	Code	Recommended max tightening torque Nm	Idle speed r.p.m.	Reversibility Type	Weight kg	Accessories Drive	Axial compensator bit: stroke/load mm/N	Driver to use Model	Control unit to use Model	Controller and feeding unit to use Model
15MCB05C1	111618201	1 ÷ 5	1700	↻	1,7	☐ 3/8"	-	TOD - L	TOC...	TCS-B
15MCB05C2	111618206	1 ÷ 5	1700	↻	2	☐ 3/8"	20/35	TOD - L	TOC...	TCS-B
15MCB10C1	111618231	2 ÷ 10	700	↻	1,8	☐ 3/8"	-	TOD - L	TOC...	TCS-B
15MCB10C2	111618236	2 ÷ 10	700	↻	2,1	☐ 3/8"	20/35	TOD - L	TOC...	TCS-B
15MCB20C1	111618261	4 ÷ 20	350	↻	1,8	☐ 3/8"	-	TOD - L	TOC...	TCS-B
15MCB20C2	111618266	4 ÷ 20	350	↻	2,1	☐ 3/8"	20/35	TOD - L	TOC...	TCS-B
17MCB30C1	111618290	6 ÷ 30	600	↻	2,6	☐ 3/8"	-	TOD - H1	TOC...	-
17MCB30C2	111618295	6 ÷ 30	600	↻	2,9	☐ 3/8"	20/35	TOD - H1	TOC...	-
17MCB20C1	111618370	4 ÷ 20	1500	↻	4,7	☐ 3/8"	-	TOD - H2	TOC...	-
17MCB20C2	111618375	4 ÷ 20	1500	↻	5	☐ 3/8"	50/65	TOD - H2	TOC...	-
17MCB35C1	111618380	7 ÷ 35	700	↻	4,7	☐ 1/2"	-	TOD - H2	TOC...	-
17MCB35C2	111618385	7÷ 35	700	↻	5	☐ 1/2"	50/65	TOD - H2	TOC...	-
17MCB50C1	111618390	10 ÷ 50	500	↻	5,2	☐ 1/2"	-	TOD - H2	TOC...	-
17MCB50C2	111618395	10 ÷ 50	500	↻	5,5	☐ 1/2"	50/65	TOD - H2	TOC...	-
47MCB45C1	111618400	10 ÷ 45	1250	↻	7	☐ 1/2"	-	TOD - H3	TOC...	-
47MCB45C2	111618405	10 ÷ 45	1250	↻	7,3	☐ 1/2"	50/65	TOD - H3	TOC...	-
47MCB65C1	111618410	14 ÷ 65	600	↻	7	☐ 1/2"	-	TOD - H3	TOC...	-
47MCB65C2	111618415	14 ÷ 65	600	↻	7,3	☐ 1/2"	50/65	TOD - H3	TOC...	-
47MCB90C1	111618420	18 ÷ 90	420	↻	7	☐ 1/2"	-	TOD - H3	TOC...	-
47MCB90C2	111618425	18 ÷ 90	420	↻	7,3	☐ 1/2"	50/65	TOD - H3	TOC...	-

Legend

15 = Power of the motor/10 • **MC** = Nutrunner motor • **B** = Electric brushless • **05** = Maximum torque in Nm • **C** = Current absorption control
1 = Output with square drive without axial compensator • **2** = Output with square drive with axial compensator

Legend

↻ **Reversibility:** All models are suitable for tightening and untightening operation

- Noise level has been measured in accordance with ISO 3744 and ISO 15744 standards.
- Accessory drive: male square drive in accordance with ISO 1174-1.
- The code number must be used when ordering.

Data shown in the table are indicative and can be changed without prior notice.
Torque values are purely indicative and may be influenced by the softness of the type of joint, by the type and length of the screw, and by the type of accessory used. For all further details, please apply to **Fiam Technical Consultancy Service**.

Driver to use: see page 24
Control unit to use: see pages 19-23
Controller and feeding unit: see page 18
Kit of cables: see page 9

*The highlighted models are equipped with a built-in angle transducer (resolver) that guarantees an elevated resolution in the angle measurement and therefore it assures an excellent tightening process control.

Standard equipment (supplied with motor)	Accessories/Services available upon request	Models available upon request
• Axial compensator (where indicated: see chart). • Flange bracket to fix the motor . • Test certificate. • Use and maintenance manual. • Eco-friendly packaging.	• Bits, sockets etc. (see Accessories cat. no. 78). • Test/checking service of assembly system at the client's production lines directly • Suspension arms, fastening slides and accessories for automation of the tightening process: please apply to the **Fiam Technical Consultancy Service** • Quick change chuck for 15/17MCB... only with ☐ 3/8" (code 654141010).	• Models with front offset (very reduced center distance).

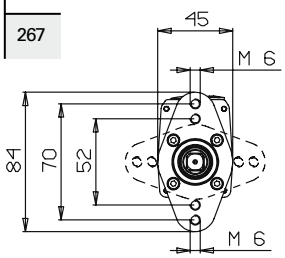
Connecting cables

The **cables connecting** motors, the drivers and control units are extremely **flexible and safe**: the special construction material **eliminate** any possible **interference** or **noise** coming from other equipments.
Fiam cables are manufactured to resist to particularly strong dynamic stress: this guarantees a reduction of machine stop, caused by premature breaks of the cables, resulting in saving on maintenance of the tightening system.
Codes refer to the complete kit including: feed cables, control cable, sensor cable, etc.

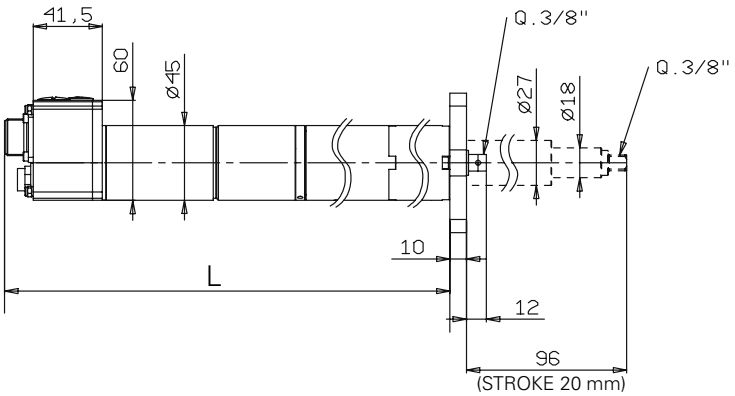
Description	Lenght of the cable mt.	Code of the cable
Kit of cable for motors 15MCB...C	5	686000872
	10	686000873
	15	686000874
Kit of cable for motors 17MCB30 C	5	686000869
	10	686000870
	15	686000871
Kit of cable for motors 17MCB 20/35/50 C	5	686000863
	10	686000864
	15	686000865
Kit of cable for motors 47MCB 45/65/90 C	5	686000863
	10	686000864
	15	686000865
Kit of cable for motors 15MCB...C and TCS-B controller and feeding unit	5	686200601
	10	686200602
	15	686200603

Electric motors 15MCB...

Model	L
15MCB05C1	233
15MCB05C2	244
15MCB10C1	256
15MCB10C2	267
15MCB20C1	256
15MCB20C2	267

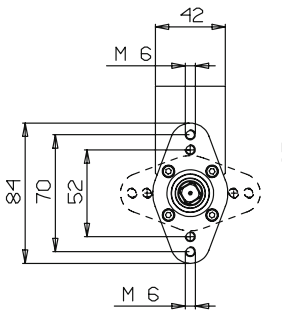


Flange bracket to fix
the motor to the support
(included)

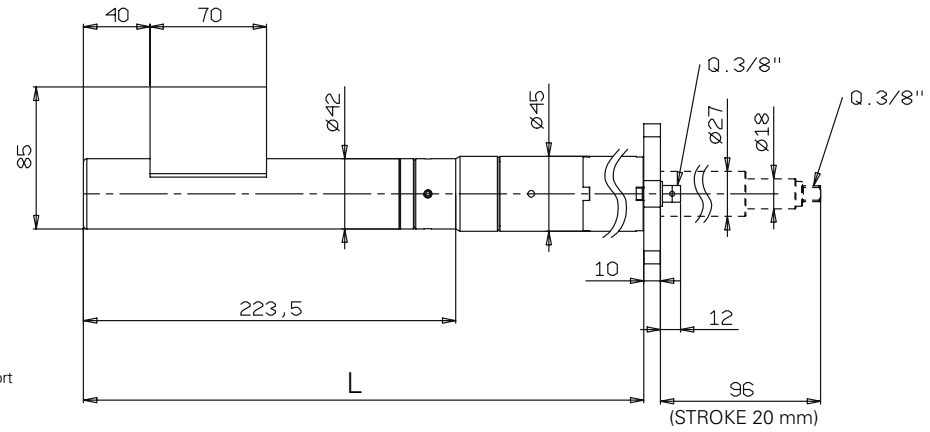


Electric motors 17MCB...

Model	L
17MCB30C1	325,5
17MCB30C2	336,5

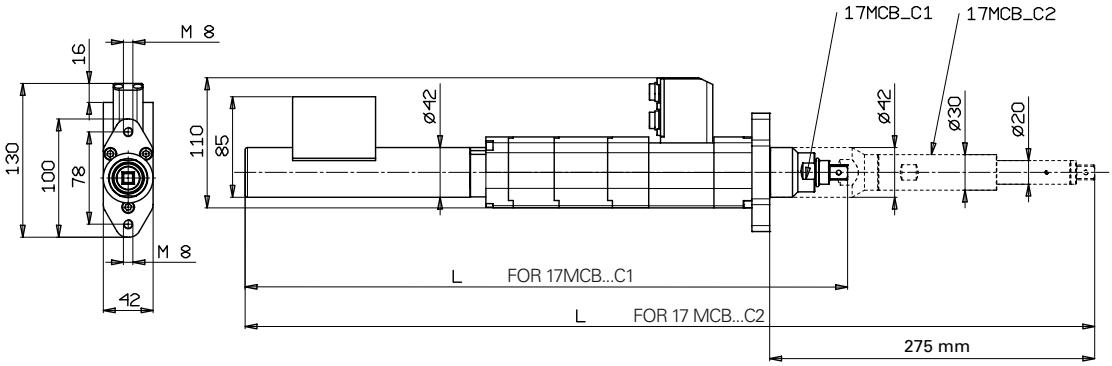


Flange bracket to fix
the motor to the support
(included)



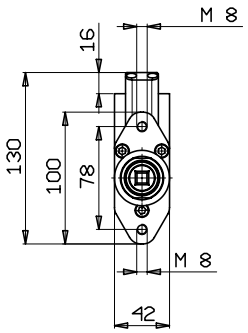
Electric motors 17MCB...C

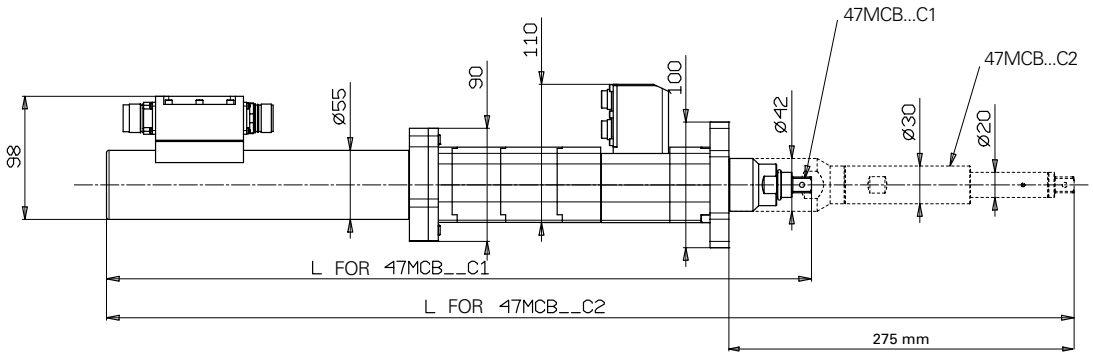
Model	L
17MCB20C1	458,5
17MCB20C2	667
17MCB35C1	508
17MCB35C2	716
17MCB50C1	508
17MCB50C2	716



Electric motors 47MCB...C

Model	L
47MCB45C1	516
47MCB45C2	724,5
47MCB65C1	561
47MCB65C2	770
47MCB90C1	561
47MCB90C2	770





Electric nutrunner motors with torque and angle control

Thanks to their modularity, compactness and versatility, these new electric nutrunner motors are able to **solve many tightening needs, also very complex**.
They are mainly used in multispindle units for fastening operations where more screws are fastened simultaneously and when it is important to carry out **extremely accurate tightenings** to guarantee the final quality of the product.

These new motors are fitted with an **electronic transducer** to read the torque applied to the screw; while the angle is read **directly by appropriate sensors**.
These motors together with the feed and control units guarantee extreme precision and accuracy and **maximum quality of the tightening process and of the assembled product.**

15MCB20A1

Reliability

Long lifetime of the components thanks to careful design and to quality of the productive process which results in less maintenance and repair costs

The electronic transducer integrated in the static brushless motor is of **limitless duration**

Some moldels (highlighted in the chart on page 14) are equipped with a **built-in angle transducer (resolver)** that guarantees an elevated resolution in the angle measurement and the therefore it assures an **excellent tightening process control**

A suitable programming of the control unit allows **high torque repeatability** and **reduced torque scattering**

They are performing even if the joint features change from one piece to another: these motors are not affected by these changes which are considered normal in the tightening operations and they guarantee the **achievement of the programmed parameters**

These motors are powered by a **driver unit and a computerised control unit**, which are programmable according to customer's need. Each fastening parameter is checked (torque, angle, speed), and it is possible to **view, print, store and collect statistical data**

They are particularly effective in ISO 9000 environments

Don't be satisfied with the maximum

Perfection for your solutions

Naturally innovative

Productivity

Considerable increase of the efficiency, of the tightening cycle thanks to innovative design concept

They are mainly used in multispindle units for fastening operations with one or more spindle. These motors ensure a combination of high quality and increased productivity in the fastening process, since **more screws are fastened simultaneously under the same time-cycle conditions**

With maximum continuity they ensure **high tightenng constancy**; in fact the values of torque scattering are extremely reduced

They have a **compact design** and therefore **reduced dimensions and weights**: this facilitates their use on manipulators used in robotic assembly

Considerable reduction of the productive times: **there is no need of post-process as extremely precise fastening is guaranteed**

Ergonomics

Optimization of performances in regard to ergonomics and operator safety in working environments

They meet the most important ergonomic requirements such as **low noise level** and **maximum safety** (thanks to the low electric voltage); so they guarantee comfortable working environment to the operators

Ecology

Innovative systems designed paying even more attention with respect to environment and its safeguard

They **safeguard the working environment** from the presence of environmental pollution caused by the oil exhaust of the compressed air

All the components **are easy to dispose of** because they are built using recyclable materials

All Fiam products are supplied **eco-friendly packaging**

Electric nutrunner motors with torque and angle control
up to 90 Nm

Model	Code	Recommended max tightening torque Nm	Idle speed r.p.m.	Reversibility Type	Weight kg	Accessories Drive	Axial compensator bit stroke/load mm/N	Driver to use Model	Control unit to use Model
15MCB05A1	111618216	0,5 ÷ 5	1700	↻	2,3	3/8"	-	TOD - L	TOC...
15MCB05A2	111618221	0,5 ÷ 5	1700	↻	2,6	3/8"	20/35	TOD - L	TOC...
17MCB05A1	111618430	0,5 ÷ 5	700	↻	3,2	3/8"	-	TOD - H1	TOC...
17MCB05A2	111618435	0,5 ÷ 5	700	↻	3,5	3/8"	20/35	TOD - H1	TOC...
15MCB10A1	111618246	1 ÷ 10	700	↻	2,4	3/8"	-	TOD - L	TOC...
15MCB10A2	111618251	1 ÷ 10	700	↻	2,7	3/8"	20/35	TOD - L	TOC...
17MCB10A1	111618440	1 ÷ 10	700	↻	3,2	3/8"	-	TOD - H1	TOC...
17MCB10A2	111618445	1 ÷ 10	700	↻	3,5	3/8"	20/35	TOD - H1	TOC...
15MCB20A1	111618276	2 ÷ 20	350	↻	2,4	3/8"	-	TOD - L	TOC...
15MCB20A2	111618281	2 ÷ 20	350	↻	2,7	3/8"	20/35	TOD - L	TOC...
17MCB30A1	111618300	3 ÷ 30	600	↻	3,2	3/8"	-	TOD - H1	TOC...
17MCB30A2	111618305	3 ÷ 30	600	↻	3,5	3/8"	20/35	TOD - H1	TOC...
17MCB20A1	111618310	2 ÷ 20	1500	↻	4,7	3/8"	-	TOD - H2	TOC...
17MCB20A2	111618315	2 ÷ 20	1500	↻	5	3/8"	50/65	TOD - H2	TOC...
17MCB35A1	111618320	4 ÷ 35	700	↻	4,7	1/2"	-	TOD - H2	TOC...
17MCB35A2	111618325	4 ÷ 35	700	↻	5	1/2"	50/65	TOD - H2	TOC...
17MCB50A1	111618330	5 ÷ 50	500	↻	5,2	1/2"	-	TOD - H2	TOC...
17MCB50A2	111618335	5 ÷ 50	500	↻	5,5	1/2"	50/65	TOD - H2	TOC...
47MCB45A1	111618340	5 ÷ 45	1250	↻	7	1/2"	-	TOD - H3	TOC...
47MCB45A2	111618345	5 ÷ 45	1250	↻	7,3	1/2"	50/65	TOD - H3	TOC...
47MCB65A1	111618350	7 ÷ 65	600	↻	7	1/2"	-	TOD - H3	TOC...
47MCB65A2	111618355	7 ÷ 65	600	↻	7,3	1/2"	50/65	TOD - H3	TOC...
47MCB90A1	111618360	9 ÷ 90	420	↻	7	1/2"	-	TOD - H3	TOC...
47MCB90A2	111618365	9 ÷ 90	420	↻	7,3	1/2"	50/65	TOD - H3	TOC...

Legend

15 = Power of the motor/10 • MC = Nutrunner motor • B = Electric brushless • 05 = Maximum torque in Nm • A = Torque/angle control
1 = Output with square drive without axial compensator • 2 = Output with square drive with axial compensator

Legend

↻ **Reversibility:** All models are suitable for tightening and untightening operation

- Noise level has been measured in accordance with ISO 3744 and ISO 15744 standards.
- Accessory drive: male square drive in accordance with ISO 1174-1.
- The code number must be used when ordering.

Data shown in the table are indicative and can be changed without prior notice.
Torque values are purely indicative and may be influenced by the softness of the type of joint, by the type and length of the screw, and by the type of accessory used. For all further details, please apply to **Fiam Technical Consultancy Service.**

Driver to use: see page 23
Control unit to use: see pages 18-22
Kit of cables: see page 15

*The highlighted models are equipped with a built-in angle transducer (resolver) that guarantees an elevated resolution in the angle measurement and therefore it assures an excellent tightening process control.

Standard equipment (supplied with motor)	Accessories/Services available upon request	Models available upon request
• Axial compensator (where indicated: see chart) • Flange bracket to fix the motor • Electronic built-in transducer • Test certificate • Use and maintenance manual. • Eco-friendly packaging.	• Bits, sockets etc. (see Accessories cat. no. 33). • Test/checking service of assembly system at the client's production lines directly. • Suspension arms, fastening slides and accessories for automation of the tightening process: please apply to the **Fiam Technical Consultancy Service.** • Quick change chuck for 15/17MCB... only with ☐ 3/8" (code 654141010).	• Models with front offset (very reduced center distance).

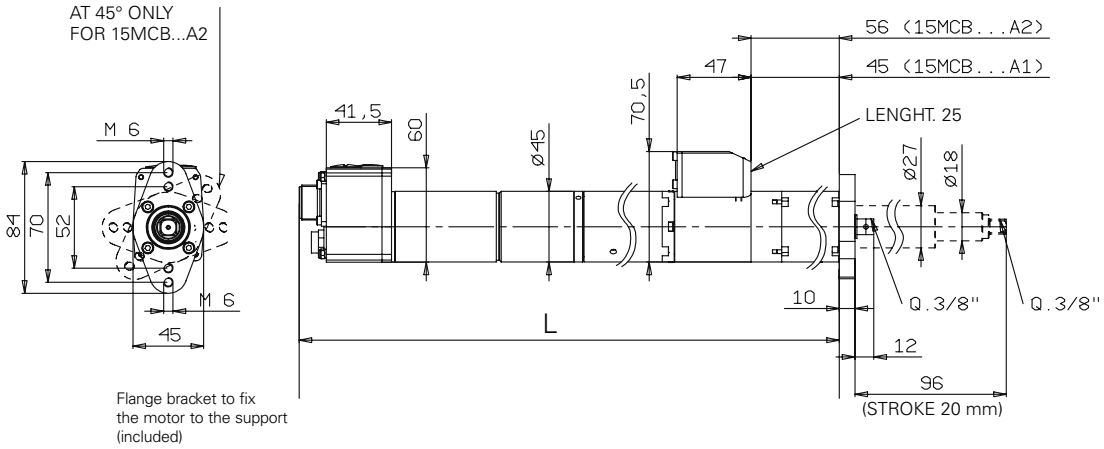
Connecting cables

The **cables connecting** motors, the drivers and control units are extremely **flexible and safe**: the special construction material **eliminate** any possible **interference** or **noise** coming from other equipments.
Fiam cables are manufactured to resist to particularly strong dynamic stress: this guarantees a reduction of machine stop, caused by premature breaks of the cables, resulting in saving on maintenance of the tightening system.
Codes refer to the complete kit including : feed cables, control cable, sensor cable, etc.

Description	Lenght of the cable mt.	Code of the cable
Kit of cable for motors 15MCB 5/10/20 A	5	686000860
	10	686000861
	15	686000862
Kit of cable for motors 17MCB 5/10/30 A	5	686000866
	10	686000867
	15	686000868
Kit of cable for motors 17MCB 20/35/50 A	5	686000863
	10	686000864
	15	686000865
Kit of cable for motors 47MCB 45/65/90 A	5	686000863
	10	686000864
	15	686000865

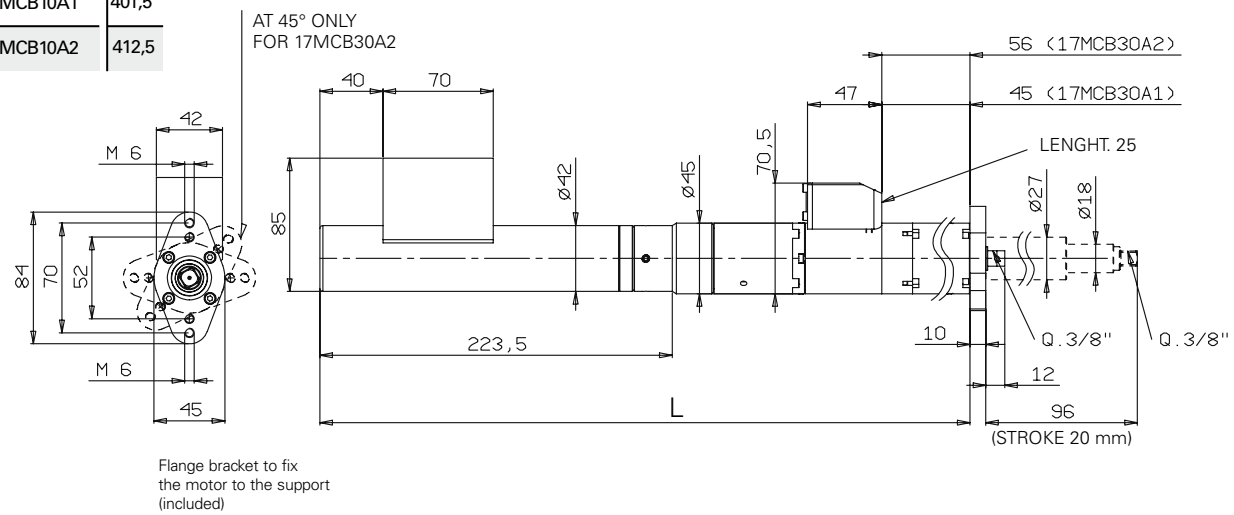
Electric motor 15MCB...A

Model	L
15MCB05A1	309
15MCB05A2	320
15MCB10A1	332
15MCB10A2	343
15MCB20A1	332
15MCB20A2	343



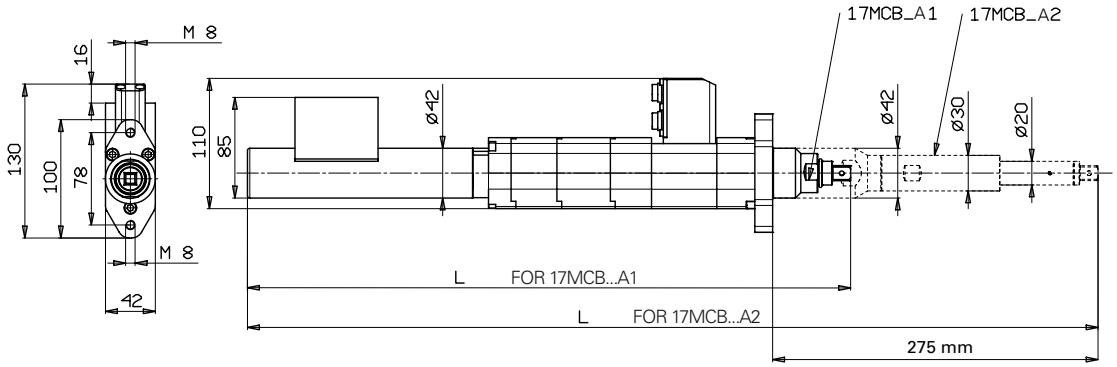
Electric motor 17MCB...A

Model	L
17MCB30A1	401,5
17MCB30A2	412,5
17MCB05A1	401,5
17MCB05A2	412,5
17MCB10A1	401,5
17MCB10A2	412,5



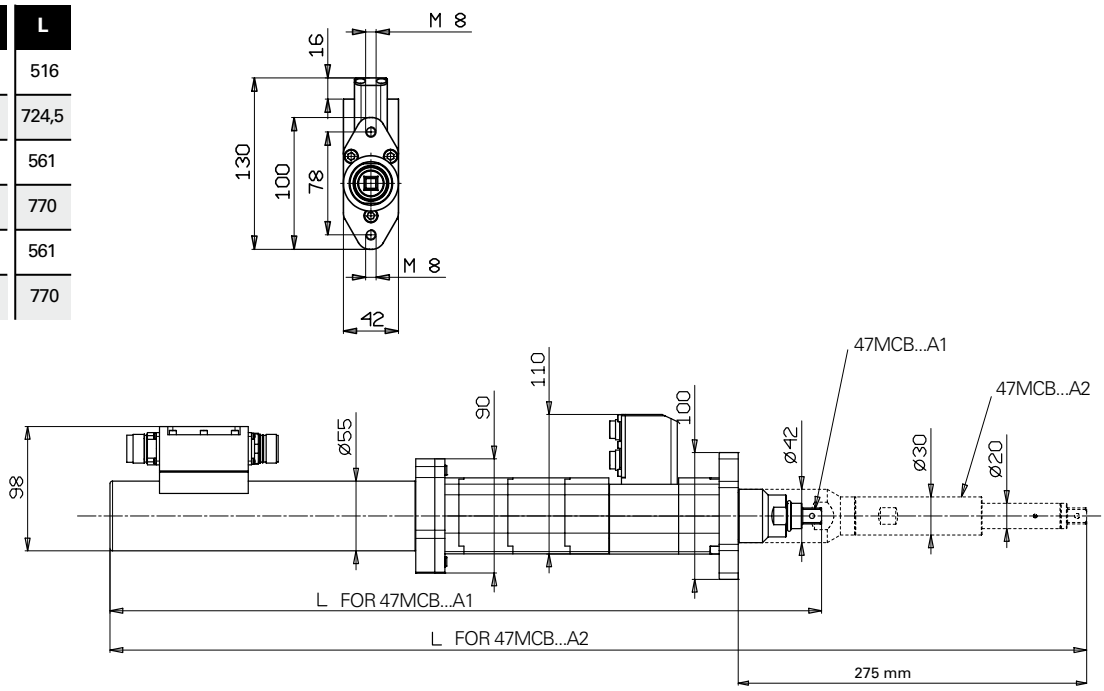
Electric motor 17MCB...A

Model	L
17MCB20A1	458,5
17MCB20A2	667
17MCB35A1	508
17MCB35A2	716
17MCB50A1	508
17MCB50A2	716



Electric motor 47MCB...A

Model	L
47MCB45A1	516
47MCB45A2	724,5
47MCB65A1	561
47MCB65A2	770
47MCB90A1	561
47MCB90A2	770



Controller and feeding unit TCS-B (Tightening Control System Basic)

For electric nutrunner motors 15MCB...C

- It can be used only with **15MCB current-control electric nutrunner motors** (up to 20Nm)
- The system **includes both controller and electrical feeding unit.**
- The display shows the **OK/NOK outcomes and the torque/angle values**
- It allows selecting **1 of 5 tightening control strategies through 4 programmes to be configured by software** (supplied with unit): torque, torque/angle, angle/torque, screw feeding function, untightening
- Equipped with **RS232** serial output for connection to printer or PC
- Equipped with **5 input and 5 output, optocoupled** (two can be freely programmed)
- OFF LINE and ON LINE programming (through software pre-installed in the unit)
- Alphanumeric display with 4 lines for 20 columns
- 4 programmes (up to 55 instructions)

Controller and feeding unit TCS-B	Code	Type of motor employed	Dimensions HxLxP	Weight	Output tension	Nominal absorption current/peak
Model			**mm**	**Kg**	**Volt**	**Ampere**
TCS-B (with software)	686200305	15MCB...C1/C2	390x155x305	10,6	70	12/36

Legend

TCS-B = Tightening Control System Basic

- Voltage: 220-240 Volt, 50 Hz

Connections

- Hall - connection to sensors of the motor
- Motor - power connection to motor
- Power - connection to electric feeding
- RS232 - connection to PC or printer
- I/O 24 Vdc - I/O 24 Vdc connections (light columns, PLC...)

Controls through led

- OK
- NOK
- RUN (in cycle)
- Led of functionality of unit

Standard equipment (supplied with unit)

- Programming software
- Feed cable
- RS232 serial output
- Eco-friendly packaging
- Use and maintenance manual

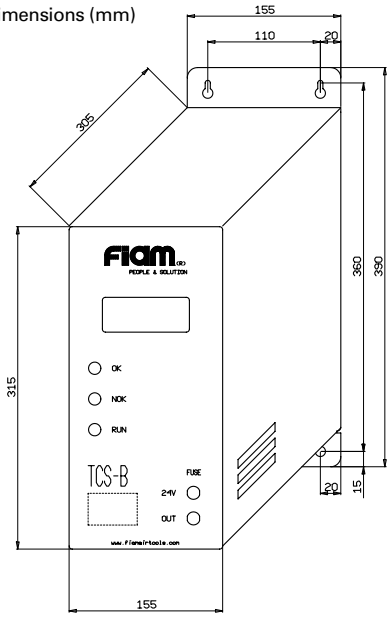
Accessories available upon request

- External memory

Controller and feeding unit TCS-B

Electric motors
15MCB...C1/2

Dimensions (mm)



Control unit TOC (Tightening Operations Controller)

For electric nutrunner motors: 15MCB... 17MCB... 47MCB...

These computerised control units of latest generation **control and monitor the assembly cycle of electric nutrunner motors both direct and indirect torque/angle**.

They detect both OK and NOT OK cycles besides the torque/time values which can be easily stored.
The computerised control units are equipped with an alphanumeric display and with a software that permits high flexibility for every tightening need.
The TOC control units are available in 1-channel or 2-channel versions: controlling one motor or two motors, which can be also different, working **synchronously** (ideal for mutispindle units) or **asynchronously** (indipendent assembly channels).
Easy to use thanks to a:

- multistage programming and macro instructions for a **quick definition of the assembly cycles**;
- alphanumeric display for a **quick cycle reading/monitoring** (time curve);
- built-in membrane keypad with **improved access to programming mode**

Control unit		Type of motor employed	Type of driver employed	Dimensions HxPxL	Weight
Model	**Code**	**Model**	**Model**	**mm**	**Kg**
TOC 1 CH	686000398	15MCB... 17MCB... 47MCB...	TOD - L TOD - H1/H2/H3	280x232x143	4,4
TOC 2 CH	686000399	15MCB... 17MCB... 47MCB...	TOD - L TOD - H1/H2/H3	280x232x143	4,4

Legend

TOC = Tightening Operations Controller • 1CH = 1-channel-version (1 motor) • 2CH = 2-channel-version (2 motors)

The computerized control unit must be set in accordance with the operating conditions of the motor: please contact our Technical Consultancy Service.

- Voltage: 220 - 240 Volt, 50 Hz

Connections

- CH1/CH2 = connections to TOD electric driver
- MAIN = connection to electric feeding
- INPUT/OUTPUT = I/O 24 Vdc electrical connections

Control through Led

- OK/NOK/RUN/ALARM
- Starting the unit

Electric motors
15MCB...C1/2
17MCB...C1/2
47MCB...C1/2
15MCB...A1/2
17MCB...A1/2
47MCB...A1/2

Standard equiment (supplied with unit)	Accessories available upon request	Models available upon request
• Electric feeding cable lenght to 2 mt. • Use and maintenance manual. • Eco-friendly packaging.	• OK/KO torque signal light column cod. 686000182 (for 1-channel-version, for 2-channel-version). • 9 pin connection cable for connecting the PC to the printer - (5 mt long). • Programmes manual selector. • RJ45TOC cable cod. 686000465 • Cable for RS232 cod. 686000879 (serial) • USB cable cod. 686000464 • Cartesian arms for torques up to 500 Nm	• Models for the management of 3 or more motors. • Models with customized software.

Technical features of the control unit TOC

The complete and simple programming menus offer:

- Up to **30 tightening programmes** with possibility to insert 20 instructions
- Setting **various tightening strategies** torque, torque/angle, angle/torque, screw feeding function, through appropriate instructions
- **Complete monitoring of the fastening cycle** through the setting of 10 instructions besides those for the definition of the control strategies

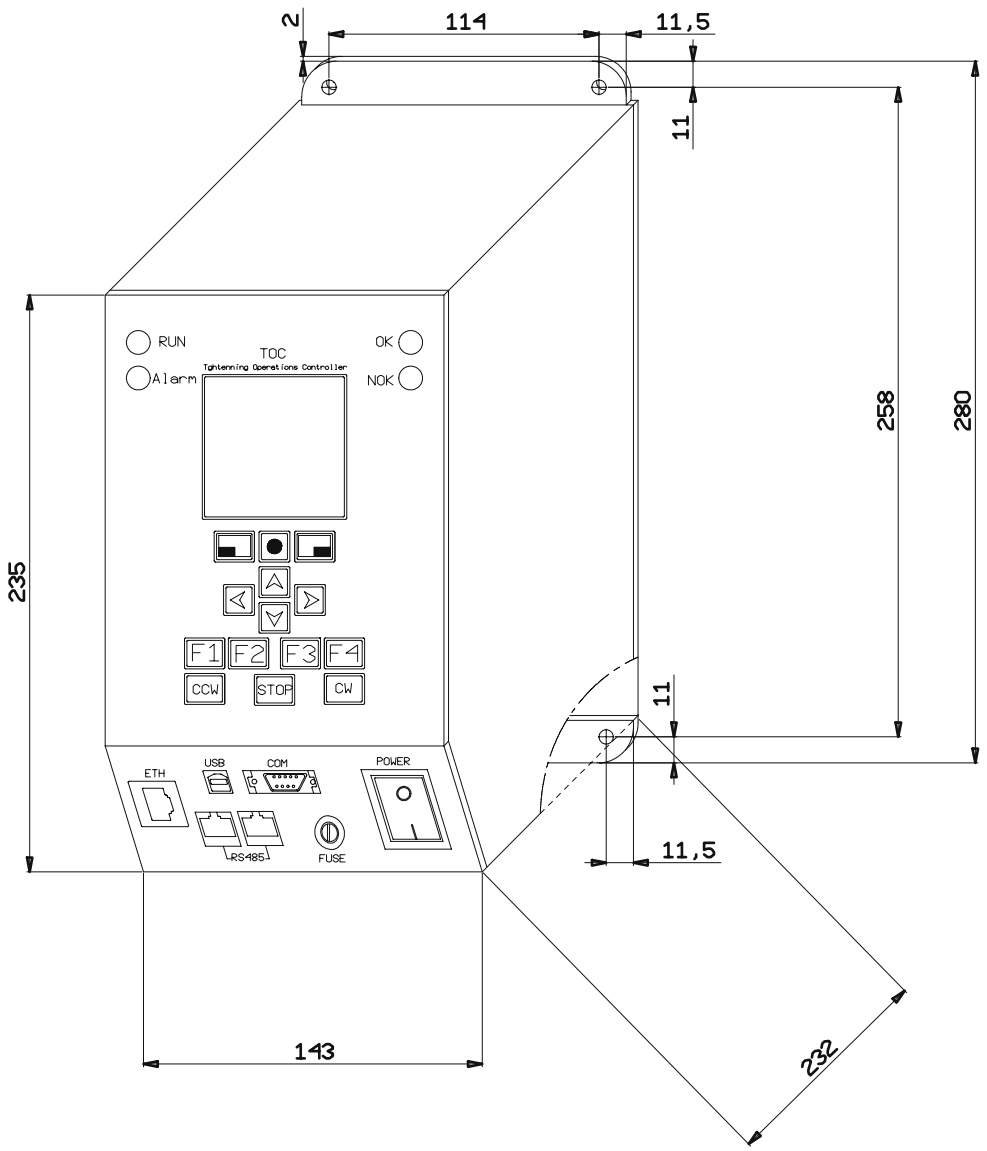
The I/O of the unit allows to:

- **OK/NOK signalling for each cycle** and timed end cycle signalling
- **PLC interface** through 16 inputs and 16 outputs type PNP/NPN, PC inputs with at 5 bit codification
- **General statistics** up to 1 million tightenings (CP, CPK, Range, Average, Sigma) on the stored tightening data
- **1 user configurable on-line printing** model
- The internal memory **stores torque/time/result** data concerning the last **7.000 tightening** cycles (TOC 2CH: 7.000 or TOC 1CH: 14.000)
- **RS232 serial output** for connection to printer or PC
- Arranged for connection to **Ethernet**
- Upon request for **field-bus** modules

Other features:

- **Membrane programming** keyboard
- **Electrically powered (a.c.)**: if power is interrupted, the data **memory** is saved by a battery
- The **calibration of the motor** is carried out by two methods:
  - **manual** (insertion of the motor's specific data)
  - **automatic** (choice of the motor connected by internal database)
- **Visual indicators** located on the panel

OK = GREEN= correct tightening
NOK = RED = incorrect tightening
RUN = ORANGE = tightening cycle in progress
ALARM = RED = error



Dimensions (mm)

Profibus-DP interface for TOC control unit

Fiam PROFIBUS-DP INTERFACE FOR TOC can be used to expand the TOC control unit's connectivity capabilities through connection to the main Fieldbuses found in industrial plants.

Possible operations are as follows:

- **Remote selection** (i.e. from supervisor PLC) of a program that has been previously set using the relevant keypad built into the TOC (i.e. you program the on-board TOC first, then use the remote PLC, selecting whichever program you want to use);
- **STARTING** and **STOPPING** the selected program;
- **Acquiring** data on torque, angle, OK/NOK result for each tightening operation;
- **Acquiring** TOC status (ready/not ready).

Advantages

- Remote management of control unit (once programmed via keypad).
- The control unit is INDEPENDENT of the type of Fieldbus: same TOC with different Fieldbuses (it is necessary to simply replace the interface).
- Single interface for TOC 1CH and TOC 2CH.
- Decreased "distance" between TOC control unit and PLC

Interface type	Code	For control unit type	Dimensions LxWxD mm	Weight gr
PROFIBUS – DP	686000886	TOC 1CH and TOC 2CH	120 x 75 x 27	145
DEVICE-NET	on request	TOC 1CH and TOC 2CH	120 x 75 x 27	145
INTERBUS	on request	TOC 1CH and TOC 2CH	120 x 75 x 27	145

Standard Equipment (supplied with unit)

- Cable for connection to TOC
- Eco-friendly packaging
- Use and maintenance manual
- TOC control unit software activation

Models available upon request

- DEVICE-NET interface for TOC control unit
- INTERBUS interface for TOC control unit
- Other Fieldbuses

Accessories available upon request

- 24Vdc power supply unit

To manage the TOC control units directly via a Personal Computer: new TOC-NET software

This new software can be installed on a Personal Computer running Wndows. It **allows the programming and acquisition of the TOC control unit's data to be managed in real time directly via a Personal Computer instead of through the unit's keypad.**

There are two options for performing this operation via a PC:

Local Mode Ideal for production facilities without Ethernet networks	Via **TOC-NET-L** software installed on PC placed nearby + RS 232 and USB serial ports	Length of cable between PC and TOC unit is a limit
Remote Mode For production facilities with Ethernet networks	Via **TOC-NET-R** software installed on PC in turn connected to Ethernet network via LAN cable	No distance limitations Ethernet network must be of industrial kind to allow higher transfer rate

Technical features and advantages

- The software can be installed on a PC running **Windows XP** or later operating system (version for Windows 2000 available upon request)
- Gives **realtime view** of what's happening in the production line
- Programming data, acquired data and those relating to work in progress are all **displayed in a single window**
- **Commands and menus are displayed exactly the same way as they are on the TOC unit:** anyone familiar with programming the TOC unit via the keypad will find extremely easy to operate the TOC unit from his own office
- **Data programming and receiving procedure is extremely straightforward** and immediately easy to grasp
- This software can be used **to create countless number of programs, i.e. in addition to the 30 that can be loaded on the TOC, others can be created and stored in the PC, ready to be downloaded to the TOC when necessary**
- Once saved on the PC, **programs can be copied, renamed and edited at any time,** providing endless management and reprocessing options
- The TOC's current storage limit (14,000 for one channel and 7,000 + 7,000 for 2 channels, in terms of "strings" of data) is **exceeded by uploading, i.e. exporting tightening results from the TOC and storing them on the PC. Once exported, they can be deleted from the TOC, which is thus ready for newer results.**
- **The data exported** from the TOC **are opened automatically in Excel, ready to be processed:** no waste of time for additional settings
- The software is available in **Italian and English. On request,** it can also be supplied in **different languages:** this would be the case, for example, when dealing with production facilities located abroad and run via Ethernet networks
- **Errors detected by the TOC** (alarm function) **are automatically sent to an email inbox** that is set up previously (for TOC-NET R version only). Via this system, **realtime warnings can be sent concerning any trouble detected by the TOC** and hence regarding the state of the assembly process on the production lines (e.g. incorrect programming, driver malfunction, etc.)
- Only one TOC control unit at a time can be connected to the PC in "remote" mode.

Description	Model	Code
SOFTWARE TOC-NET L	TOC – NET L	686000461
SOFTWARE TOC-NET R	TOC – NET R	686000462

Legend

TOC-NET L = for "local" version • TOC-NET R = for "remote" version

Standard equipment (supplied with the software)

- Use manual
- HW USB key for TOC-NET (necessary for software activation) cod. 686000463

Electric driver TOD (Tightening Operations Driver)

For electric nutrunner motors: 15MCB... 17MCB... 47MCB...

Used to **feed the motor and supply correct feed parameters** (voltage, current, etc...) following data pre-set in the control unit. The unit is equipped with a control system for tension, voltage and temperature values, dispersion towards ground and interruption of ground wire. Any possible failure is flashed by means of luminous diodes and the system stops immediately. Available two versions:

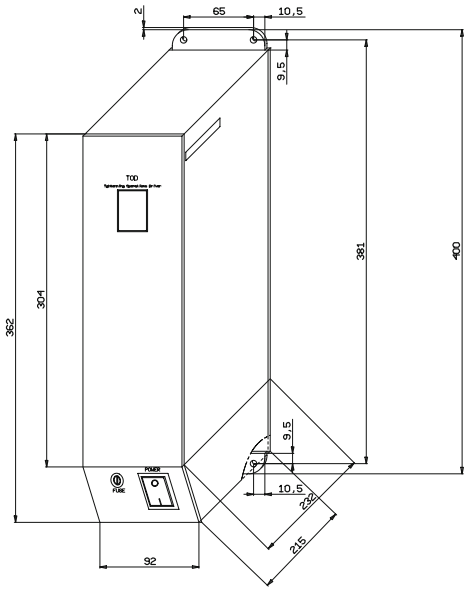
- **TOD-L** to feed electric motors with tightening torque from 1 to 20 Nm
- **TOD-H1, TOD-H2, TOD-H3** to feed electric motors with tightening torque over 20 Nm

Driver		Type of motor employed	Type of control unit employed	Dimensions HxPxL	Weight	Output tension	Nominal absorption current/peak
Model	**Code**	**Model**	**Model**	**mm**	**Kg**	**Volt**	**Ampere**
TOD - L	676120001	15MCB...C1/C2 15MCB...A1/A2	TOC...	400x232x92	8,7	60	10/20
TOD - H1	676120008	17MCB30C1/C2 17MCB30A1/A2	TOC...	400x232x92	6,8	300	20/40
TOD - H2	676120009	17MCB20C1/C2 17MCB35C1/C2 17MCB50C1/C2 17MCB20A1/A2 17MCB35A1/A2 17MCB50A1/A2	TOC...	400x232x92	6,8	300	20/40
TOD - H3	676120010	47MCB45C1/C2 47MCB65C1/C2 47MCB90C1/C2 47MCB45A1/A2 47MCB65A1/A2 47MCB90A1/A2	TOC...	400x232x92	6,8	300	20/40

Driver TOD

Electric motors
15MCB...C1/2
17MCB...C1/2
47MCB...C1/2
15MCB...A1/2
17MCB...A1/2
47MCB...A1/2

Dimensions (mm)



Legend

TOD = driver • L = for motors with tightening torque from 1 to 20 Nm • H1, H2, H3 = for motors with tightening torque over 20 Nm

- Voltage: 220 - 240 Volt 50 Hz

Connections

- Feedback - connection to the transducer/ resolver of the motor
- Motor - power connection to motor
- Hall/PC - connection to sensors of the motor (for TOD-L) and to PC (for TOD-H)
- Controller - connection to TOC control unit

Controls through Led

- Generic led of functionality of driver

Keyboard operations

- General switch

Standard equipment (supplied with the unit)

- Feed cable.
- Eco-friendly packaging.
- Use and maintenance manual.

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