## The WorkCenter F3

### All aboard

The WorkCenter F3 is completely automatic in operation and has been designed for practical workshop application. Opening the doors turns the machine into a totally equipped WorkCenter. The tool storage area is located in the front – the tools are neatly laid out and easily viewed. No other workbenches or tool racks are required. Special convenient-to-handle tools make the machine set-ups and tool changes easier. Thanks to automatic tool recognition, the operator has only to press the start button, whereupon the tube is formed into the correct shape in one pass. This means that EO2-FORM and EO-3® connections are extremely simple to manufacture. The WorkCenter F3 is so reliable because of its powerful hydraulic drive and robust forming tools.


- Workshop machine for universal use
- 6 to 38/42 mm tube OD
- Cycle time approx. 20 seconds
- Especially advantageous for: Hydraulic presses, cranes and lifts, heavy machinery, shipbuilding, offshore and hydraulic steelworks

## The WorkCenter PRO22

### Mass production without tears

The WorkCenter PRO22 is based on proven EO2-FORM technology and was specially designed for the economic production of EO2-FORM tube fittings. Compared with the WorkCenter F3, the PRO22 production machine works considerably more efficiently and can machine tighter tube bends. Because of its powerful drive and efficient cooling, continuous mass production on a shift-work basis is provided for. In addition, the machine is especially quiet and vibration-free in operation. Small to medium tubes from 6 to 22 mm can be accommodated on the new machine. The compact assembly head enables even tight tube bends to be machined.

- Production machine for economical and fail-safe manufacturing
- 6 to 22 mm tube OD
- Cycle time approx. 6 seconds
- Advantageous for applications such as: manufacturers of agricultural machinery, construction machines, trucks, fork lift trucks and other mass-produced hydraulic equipment

| Technical Data | |
|---|---|
| **Machine** | **WorkCenter F3 and PRO22** |
| Designated use | Cold forming of tube ends for tube connections |
| Method | Axial swaging |
| Suitable for | EO tube fittings to DIN EN ISO 8434-1, EO-3® fittings |
| | Hose Connections to DIN 71550 |
| **Tube specification** | |
| Steel tubing | E235 / ST37.4; E355 / ST52.4 |
| Stainless steel tubing | 1.4571 |
| Other materials | CuNiFe, duplex and others on request |
| Boiler tube | Tubes for turbine construction on request |
| **Tools** | Interchangeable |
| Forming die sets | “MF3” single part forming die sets, one type for each tube OD |
| Forming pin | “BF3” forming pin with inner mandrel, one type each per tube OD, wall thickness and material |
| **Function** | |
| Tool change | Manual |
| Setting | Automatic tool recognition and pressure setting |
| Tube clamping | Hydraulic |
| Forming | Hydraulic |
| Controls | Automatic sequence: after pressing START button: Clamp – form – withdraw – unclamp |
| **Environmental conditions** | |
| Working temperature | +10 … +50°C |
| Relative humidity | Msc. 90%, non-condensing |

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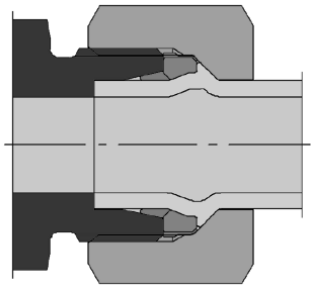
## WorkCenter F3 and PRO22



| Type | WorkCenter F3 | WorkCenter PRO22 |
|---|---|---|
| **Specifications** | | |
| Type | Universal workshop machine | Powerful production machine |
| Design | WorkCenter | WorkCenter |
| Application | Alternative to welding | Efficient mass production |
| Weight | Approx. 330 kg | Approx. 375 kg |
| Dimensions (L×B×H) | 660 × 800 (open: 1,300)×1,150 | 660 × 800 (open: 1,300)×1,200 |
| Electrical supply | 400 V, 50 Hz, 3 phase<br>230 V, 50 Hz, 3 phase<br>440 V, 60 Hz, 3 phase | 400 V, 50 Hz, 3 phase |
| Electric motor drive rating | 4 kW | 4 kW |
| Oil cooler | Optional | Standard |
| **Performance data** | | |
| Steel tube | 6×1 ... 38×7/42×4 | 6×1 … 20×2/22×2 |
| Stainless steel tube | 6×1 … 38×5/42×3 | 6×1 … 20×2/22×2 |
| Minimum width U-bend | Approx. 135 mm | Approx. 100 mm |
| Cycle time | 15–20 sec. | Ca. 6 sec. |
| Economic production quantitiy | Max. 100 formings/hour<br>Max. 200 forming/hour<br>(with oil cooler) | Max. 600 formings/hour |
| **Applications** | Ideal for project and workshop tasks, small batches and on-site installations. Tubes of all sizes. | Economic mass production of small to medium tube dimensions |

## Features, advantages and benefits

1. **Process / Product concept** – The EO2-FORM technology is not a stand-alone machine or a new fitting system. It is a product extension of the EO-2 range which has existed since 1993. Exactly the same, proven seal elements are used.

2. **Workcenter concept** – All tools, handling devices, lubricants and the operator manual are well organised inside the machine. Once the doors are opened, the machine turns into a stand-alone workcenter for tube preparation. On the top shelf, there are practical compartments for rules, pens, lubricant and standard EO-boxes with nuts and sealing rings. No additional workbenches or shelves for tooling are required.

3. **Easy operation** – One single START-button is all that needs to be operated to run a forming cycle completely. No “zero position” or “reset” activities have to be performed in-between two forming cycles. For efficient mass production, a foot switch is available. A label on the machine head shows all operation steps in pictograms and all important dimensions in charts.

4. **Easy tool change** – An ergonomic, pistol-like device allows quick and easy change of the one-piece clamping die set without opening the forming head or even touching the tools. Another handle speeds up the setup process of the forming pin in the bayonet mechanism.

5. **Easy handling** – Standard tools and one set of EO-2 sealing rings are suitable for all common hydraulic tube dimensions. No special sleeves are required for thin wall or small diameter tube.

6. **Well organised** – All tools and accessories are well organised in a practical compartment inside the machine housing. Nothing gets dirty, lost or confused.

7. **Easy transport** – The machine is equipped with heavy duty wheels so that it can be moved around by one person without hard work or additional equipment. Special attachments for crane and forklift truck transport are standard. A reeling serves as handle, protection and attachment for fixing belts when transported by truck. Tools and all accessories are safely and cleanly stored inside.

8. **Easy logistics** – EO2-FORM uses the same components as EO-2. Special sets of nuts and sealing rings can be ordered with one part number (FORM …). This reduces ordering effort and contributes to achieve availability with optimum inventory.

9. **Stainless steel capabilities** – Forming pins for stainless steel tubes are specially designed for optimum forming results and surface coated for maximum lifetime. All forming pins for stainless steel tube are marked with a blue dot. Clamping dies can be used for both, steel and stainless steel tube.

10. **Approved functional system** – EO2-FORM has been on market for years. It is approved for use in shipbuilding, offshore industry, hydraulic water lock systems, press and crane manufacturing, heavy mobile equipment and general machine building. EO2-FORM is tested and approved from authorities like German Lloyd, DNV or from end-users like Daimler-Chrysler.

11. **Cost saving** – Compared to welding or brazing, EO2-FORM and EO-3® are much less time consuming. Special tube preparation and finishing are not necessary. Cold forming uses only a fraction of the energy needed for brazing or welding.

12. **Superior vibration resistance** – The process achieves a smooth structural transformation of the tube wall. There are no sharp edges or notches to reduce the vibration resistance.

13. **Superior mechanical strength** – The working contact area of the EO2-FORM connection is the flat front surface of the metal support ring which is made of heat-treated, high-strength steel or stainless steel. This provides superior mechanical strength without settling, loosening or need for re-tightening.

14. **Universal** – The WorkCenter can cold-form all common steel and stainless steel tube materials for hydraulic pipework. Even exotic materials such as Cu-NiFe or Duplex can be formed. The tools cover metric tube sizes from 6 to 42 mm OD.

15. **Short tube ends** – The compact clamping device and special dies are suitable for machining complex tube bends.

16. **Noise/energy loss reduction** – The process results in a smooth inner contour of the tube. Minimum pressure drop, heat and noise is created. No hidden corners allow the accumulation of air, dirt or other sources of trouble.

17. **Clean** – The process is environmental clean and safe. As no heat is used, hazards from fumes or heat do not occur.

18. **Zinc plated tubing** – The process allows the use of zinc-plated tubing. The costs of cleaning or painting are saved.

19. **Quality** – Tube clamping and tool functions are fully automated. Proper joint geometry and seal dimensions are achieved by using standard EO-2 sealing rings. Therefore high and consistent quality is achieved without manual adjustment.

20. **Proven Technology** – Since 1993, millions of EO-2 fittings have operated worldwide under heavy duty conditions, providing leak-free hydraulic systems.

21. **No restrictions** – The process allows to use EO-2 elastomeric sealing technology even for applications where bite-type connectors are not permitted by safety standards, for example hydraulic presses, cranes, lifts or ship canal systems locks.

# WorkCenter for EO2-FORM and EO-3® high pressure tube connections

| Machine Type | Order code F3 | Order code PRO22 |
|---|---|---|
| WorkCenter F3 basic unit for forming tube ends, ready to operate with magnetic gripper, holder and operator's handbook, but without tools, packed in a special transportation box | | |
| Universal F3 WorkCenter<br>Tube OD 6–38/42 mm<br>400 V, 50 Hz, 3 phase<br>230 V, 50 Hz, 3 phase<br>440 V, 60 Hz, 3 phase<br>Rental (monthly usage)<br>Leasing (24 leasing rate) | <br><br>EO2FORMF3400V<br>EO2FORMF3230V<br>EO2FORMF3440V<br>EO2FORMF3RENTFEE<br>EO2FORMF3LEASEFEE | <br><br>EO2FORM400VPRO<br><br><br>EO2FORMPRORENTFEE<br>EO2FORMPROLEASEFEE |
| | | |
| **Accessories Type** | **Order code F3** | **Order code PRO22** |
| Lubrication for forming pin:<br>EO-NIROMONT Liquid lubricant in a brush-in-cap (250 cc)<br>0.25 L bottle EO-NIROMONT<br>1L re-fill pack EO-NIROMONT | <br><br>EONIROMONTAPPLICATOR<br>EONIROMONTFLUESSX<br>LUBSS | <br><br>EONIROMONTAPPLICATOR<br>EONIROMONTFLUESSX<br>LUBSS |
| Oil cooler kit | F3/COOLERKIT | included |
| Foot switch | F3/FOOTSWITCH | F3/FOOTSWITCH |
| Magnetic gripper for forming pin | F3/PINHOLDER | F3/PINHOLDER |
| Holder for forming die set | F3/DIEHOLDER | F3/DIEHOLDER |
| Clamping segments for die set | F3/DIECLAMP | F3/DIECLAMP |
| Clamping segment spring Ø 8 mm | F3/DIECLAMPSPRING8 | F3/DIECLAMPSPRING8 |
| Clamping segment spring Ø 12 mm | F3/DIECLAMPSPRING12 | F3/DIECLAMPSPRING12 |
| Operation manual: UK, DE, FR, IT, SWE | 4033 | EO2FORMPRO/MANUAL |
| Standard preventive maintenance | EO2FORMF3/INSPECTION | EO2FORMF3/INSPECTION |

**Foot switch**

**Magnetic gripper for forming pin**

**Holder for forming die set**

WorkCenter are shipped in special containers which should be kept for future transports to avoid damage. Please don't dispose the transport boxes!

| Machine housing Type | Order code F3 | Order code PRO22 |
|---|---|---|
| Top machine cover | F3/HEADCOVER | F3PRO/08836014 |
| Top tray | F3/TOPTRAY | F3/TOPTRAY |
| Door lock for tool compartment | F3/DOORLOCK | F3/DOORLOCK |
| Door hinge | F3/DOORHINGE | F3/DOORHINGE |
| Shock absorber for doors | F3/DOORSPRING | F3/DOORSPRING |
| Tool tray for inner tool compartment (top), 6× | F3/TOOLTRAYIN | F3/TOOLTRAYIN |
| Tool tray for inner tool compartment (bottom), 6× | F3/0883611 | F3/0883611 |
| Tool tray for tool compartment in doors, 2× | F3/TOOLTRAYDOOR | F3/TOOLTRAYDOOR |
| Die insert for tool tray (use screw M6) | F3/TOOLTRAYPIN | F3/TOOLTRAYPIN |
| Holder for magnetic gripper | F3/PINHOLDERTRAY | F3/PINHOLDERTRAY |
| Holder for holder | F3/DIEHOLDERTRAY | F3/DIEHOLDERTRAY |
| Plastic guide for forklift (use screw M6) | F3/FORKGUIDE | F3/FORKGUIDE |
| Front wheel with lock | F3/FRONTWHEEL | F3/FRONTWHEEL |
| Rear wheel | F3/BACKWHEEL | F3/BACKWHEEL |

**Oil cooler kit**

| Sticker Type | Order code F3 | Order code PRO22 |
|---|---|---|
| Door label | F3/STICKERPARKER | F3PRO/STICKERPARKER |
| Short instructions on side | F3/STICKERINSTRUC | F3PRO/STICKERINSTRUC |
| Lubrication on front | F3/STICKERLUB | F3/STICKERLUB |
| Crane attachment (1 piece) | F3/STICKERCRANE | F3/STICKERCRANE |
| Forklift on front | F3/STICKERFORK | F3/STICKERFORK |

| Operation panel Type | Order code F3 | Order code PRO22 |
|---|---|---|
| Front panel counter | F3/FRONTCOUNTER | F3/FRONTCOUNTER |
| “START” switch (black with symbol) | F3/STARTSWITCH | F3/STARTSWITCH |
| “RESET” switch (blue) | F3/RESETSWITCH | F3/RESETSWITCH |
| “ON” switch (green) | F3/ONSWITCH | F3/ONSWITCH |
| “OFF” switch (red) | F3/OFFSWITCH | F3/OFFSWITCH |
| Emergency stop switch (red) | F3/STOPSWITCH | F3/STOPSWITCH |

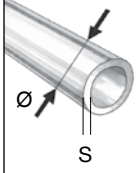
| Tool Components Type | Order code F3 | Order code PRO22 |
|---|---|---|
| Bayonet bolt for forming pin | F2/PINBOLT | F2/PINBOLT |
| Screw for clamping die segments | F3/DIESCREW | F3/DIESCREW |
| Spare part kit for clamping die set (4× Pin Ø4, 4× Spring Ø8, 4× Spring Ø12, 4× Screws) | F3/DIEKIT | F3/DIEKIT |

**Pin for forming pin**

**Pin for clamping die set**

## WorkCenter for EO2-FORM and EO-3® high pressure tube connections

**Clamping die set MF3EO-2**




**Forming pin BF3EO-2**

**Forming pin BF3P3**

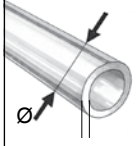
| Tube O.D. Ø | Clamping dies for steel and stainless steel tubes Order code | Ø × s | Forming pin for steel tubes Order code | Forming pin for stainless steel tubes Order code[1)2)] | EO-3® forming pin Order code |
|---|---|---|---|---|---|
| 06-L/S | MF3EO2P306 | 06×1.0<br>06×1.5<br>06×2.0 | BF3EO206X1S<br>BF3EO206X1.5S<br>BF3EO206X2S | BF3EO206X1SS<br>BF3EO206X1.5SS | BF3P306X1<br>BF3P306X1.5 |
| 08-L/S | MF3EOP3208 | 08×1.0<br>08×1.5<br>08×2.0<br>*08×2.5* | BF3EO208X1S<br>BF3EO208X1.5S<br>BF3EO208X2S<br>*BF3EO208X2.5S* | BF3EO208X1SS<br>BF3EO208X1.5SS | BF3P308X1<br>BF3P308X1.5 |
| 10-L | MF3EO2P310 | 10×1.0<br>10×1.5<br>10×2.0 | BF3EO210LX1S<br>BF3EO210LX1.5S<br>BF3EO210LX2S | BF3EO210LX1SS<br>BF3EO120LX1.5SS<br>BF3EO210LX2SS | <br>BF3P310X1.5 |
| 10-S | MF3EO2P310 | 10×1.5<br>10×2.0<br>*10×3.0* | BF3EO210SX1.5S<br>BF3EO210SX2S<br>*BF3EO210SX3S* | BF3EO210SX1.5SS<br>BF3EO210SX2SS | BF3P310X1.5 |
| 12-L | MF3EO2P312 | 12×1.5<br>12×2.0 | BF3EO212LX1.5S<br>BF3EO212LX2S | BF3EO212LX1.5SS<br>BF3EO212LX2SS | BF3P312X1.5<br>BF3P312X2 |
| 12-S | MF3EO2P312 | 12×1.5<br>12×2.0<br>*12×3.0* | BF3EO212SX1.5S<br>BF3EO212SX2S<br>*BF3EO212SX3S* | BF3EO212SX1.5SS<br>BF3EO212SX2SS | BF3P312X1.5<br>BF3P312X2 |
| 15-L | MF3EO2P315 | 15×1.0<br>15×1.5<br>15×2.0 | BF3EO215X1S<br>BF3EO215X1.5S<br>BF3EO215X2S | <br>BF3EO215X1.5SS<br>BF3EO215X2SS | <br>BF3P315X1.5<br>BF3P315X2 |
| 16-S | MF3EO2P316 | 16×2.0<br>*16×2.5*<br>*16×3.0* | BF3EO216X2S<br>*BF3EO216X2.5S*<br>*BF3EO216X3S* | BF3EO216X2SS<br>*BF3EO216X2.5SS*<br>*BF3EO216X3SS* | BF3P316X2 |

## WorkCenter for EO2-FORM and EO-3® high pressure tube connections

| Tube O.D. Ø | Clamping dies for steel and stainless steel tubes Order code | Ø × s | Forming pin for steel tubes Order code | Forming pin for stainless steel tubes Order code[1)2)] | EO-3® forming pin Order code |
|---|---|---|---|---|---|
| 18-L | MF3EO2P318 | 18×1.5<br>18×2.0 | BF3EO218X1.5S<br>BF3EO218X2S | BF3EO218X1.5SS<br>BF3EO218X2SS | BF3P318X1.5<br>BF3P318X2 |
| 20-S | MF3EO2P320 | 20×2.0<br>*20×2.5*<br>*20×3.0*<br>*20×3.5* | BF3EO220X2S<br>*BF3EO220X2.5S*<br>*BF3EO220X3S*<br>*BF3EO220X3.5S* | BF3EO220X2SS<br>*BF3EO220X2.5SS*<br>*BF3EO220X3SS* | BF3P320X2<br>*BF3P320X2.5* |
| 22-L | MF3EO2P322 | 22×1.5<br>22×2.0 | BF3EO222X1.5S<br>BF3EO222X2S | BF3EO222X1.5SS<br>BF3EO222X2SS | <br>BF3P322X2 |
| 25-S | MF3EO2P325 | *25×2.0*<br>*25×2.5*<br>*25×3.0*<br>*25×4.0* | *BF3EO225X2S*<br>*BF3EO225X2.5S*<br>*BF3EO225X3S*<br>*BF3EO225X4S* | *BF3EO225X2SS*<br>*BF3EO225X2.5SS*<br>*BF3EO225X3SS* | <br>*BF3P325X2.5*<br>*BF3EO325X3* |
| 28-L | MF3EO2P328 | *28×2.0*<br>*28×2.5*<br>*28×3.0* | *BF3EO228X2S*<br>*BF3EO228X2.5S*<br>*BF3EO228X3S* | *BF3EO228X2SS*<br>*BF3EO228X2.5SS* | *BF3EO328X2* |
| 30-S | MF3EO2P330 | *30×2.5*<br>*30×3.0*<br>*30×4.0*<br>*30×5.0* | <br>*BF3EO230X3S*<br>*BF3EO230X4S*<br>*BF3EO230X5S* | <br>*BF3EO230X3SS*<br>*BF3EO230X4SS* | *BF3EO330X2.5*<br>*BF3P330X3*<br>*BF3P330X4* |
| 35-L | MF3EO2P335 | *35×2.0*<br>*35×2.5*<br>*35×3.0* | *BF3EO235X2S*<br><br>*BF3EO235X3S* | *BF3EO235X2SS*<br>*BF3EO235X2.5SS*<br>*BF3EO235X3SS* | <br>*BF3P335X2.5*<br>*BF3P335X3* |
| 38-S | MF3EO2P338 | *38×3.0*<br>*38×4.0*<br>*38×5.0*<br>*38×6/7* | *BF3EO238X3S*<br>*BF3EO238X4S*<br>*BF3EO238X5S*<br>*BF3EO238X6+7S* | *BF3EO238X3SS*<br>*BF3EO238X4SS*<br>*BF3EO238X5SS* | *BF3P338X3*<br>*BF3P338X4*<br>*BF3P338X5* |
| 42-L | MF3EO2P342 | *42×2.0*<br>*42×3.0* | *BF3EO242X2S*<br>*BF3EO242X3S* | *BF3EO242X2SS*<br>*BF3EO242X3SS* | <br>*BF3P342X3* |

## Tools for hose connection DIN 71550

**Clamping die set MF3EO-2 and EO-3®**




**Forming pin BF3EO-2**

| Tube O.D. Ø | Clamping dies for steel and stainless steel tubes Order code | Ø × s | Forming pin for steel tubes Order code | Forming pin for stainless steel tubes Order code[1)2)] |
|---|---|---|---|---|
| 10 | MF3EO2P310 | 10×1.5 | BF3DIN7155010X1.5S | |
| 12 | MF3EO2P312 | 12×1.5 | BF3DIN7155012X1.5S | BF3DIN7155012X1.5SS |
| 15 | MF3EO2P315 | 15×2.0 | BF3DIN7155015X2S | |
| 18 | MF3EO2P318 | 18×1.5 | BF3DIN7155018X1.5S | |
| 20 | MF3EO2P320 | 20×2.5 | BF3DIN7155020X2.5S | |
| 22 | MF3EO2P322 | 22×1.5 | BF3DIN7155022X1.5S | BF3DIN7155022X1.5SS |
| 25 | MF3EO2P325 | 25×2.0 | BF3DIN7155025X2S | BF3DIN7155025X2SS |
| 28 | MF3EO2P328 | 28×1.5<br>28×2.0 | BF3DIN7155028X1.5S | BF3DIN7155028X1.5SS<br>BF3DIN7155028X2SS |
| 30 | MF3EO2P330 | 30×1.5 | | BF3DIN7155030X1.5SS |
| 32 | MF3EO2P332 | 32×1.5 | BF3DIN7155032X1.5S | |
| 35 | MF3EO2P335 | 35×2.0 | | BF3DIN7155035X2SS |

Tool compatibility: *Italic* = Tools for EO2-FORM F3 WorkCenter
Regular = Tools for EO2-FORM F3 and PRO22 WorkCenter

Please select clamping die and forming pin according to tube dimension and material.
1) All forming pins for stainless steel tubing are marked with a blue dot on front surface.
2) Stainless steel tools are TiN coated.
Clamping die sets which are only used for stainless steel tubes should be marked with the blue dot sticker to avoid use with steel tube.

**Tool lifetime**
Assembly tools are subject of wear and must be regularely (max. 50 assemblies) cleaned and checked (Checking instructions see chapter E). Worn out tools can cause dangerous assembly failures and must be replaced in time. Maximum lifetime can be achieved by following factors:

- Regular cleaning and checking
- Clean and corrosion-protected storage
- Proper de-burring and cleaning of tube end
- Proper tool selection and operation
- Use of specified lubricant