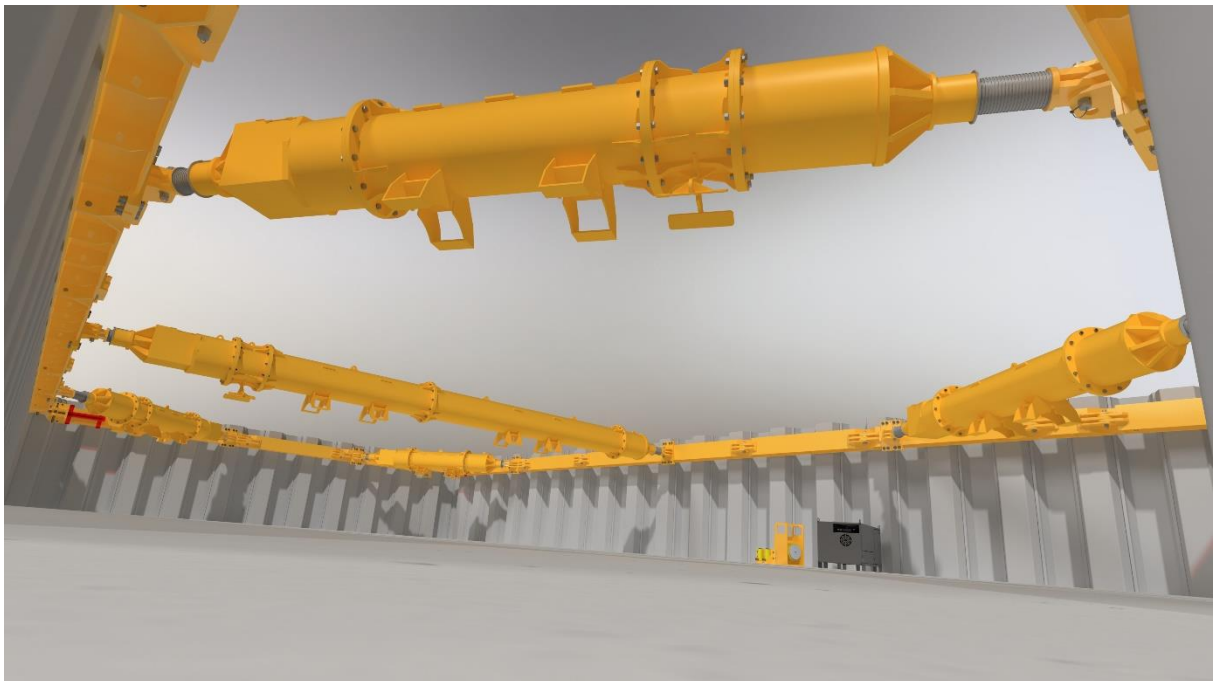


# INSTALLATION INSTRUCTIONS

## B300 & B400 Series



**THINK SAFETY, ACT SAFELY!**

**Safety rules shall always be maintained.**

**Safety always comes first.**



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## 1 Introduction

This manual contains assembly information for extensions, mechanical and hydraulic units used as a:

- length adjusting elements;
- preliminary tension devices;
- tension removal equipment.

This manual **does not contain** design instruction. Bracing and strut system works under high loads from 30 to 200 tons. All calculation and design must be performed by competent engineer with permissions correct for installation area, country and in regard to geotechnical conditions, depth of excavation and other factors that might influence design.

The appearance of provided elements may differ in details and dimensions from pictures in this manual due to size of used system. Operations needed to operate the devices are the same in all versions. Operating procedures are the same in all versions.

## 2 Description

The Meever Series bracing is very easy and straightforward to assemble, very adaptable, modular hydraulic bracing system that has interchangeable extension modules in various lengths. The B300 and B400 Series can be used with heavy duty steel trench sheets or sheet piles to support excavations of various size and depths. The B300 and B400 Series extension modules have built in shear stops to incorporate the use of knee braces and cross bracing. Braces are normally assembled and installed within the excavation using either excavators or cranes. Bigger sizes of excavations can be braced using this system with intermediate bracing struts such as the S1000 and S2000 Bracing Strut. B300 is made from grade S355 HEB300 steel sections and B400 from grade S460 HD400x187 steel sections. The extension modules are quickly assembled into brace legs using simple pin and retaining clip / bolt and nut assemblies. Each leg contains a double acting hydraulic ram & Mechanical Unit which gives 800mm of stroke for B300 and 1050mm for B400 series. These are joined together at corners to form frames with pins secured with retaining clip. Extending the rams with the Meever Power Pack and hydraulic jack allows the leg lengths to be easily adjusted to suit the excavation size. Lifting and restraining points are provided on each leg to allow the assembly / removal of the brace to be secure and safe. Meever can supply a full range of suitable lifting and restraining chains.

### 3 Product notes

- Hydraulic brace is very heavy and should only be assembled, installed and removed by competent persons and as per the installation instructions. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
- Hanging chains are connected to the sheet piles or the trench sheets and attached to the brace to help with installation / extraction of the brace and to support at all times. All the hanging chains should be connected about every 3 m and adjusted to ensure the brace is horizontal. **Hanging chains should never be used for lifting.**



*Fig. 1: example of assembly of hanging chains*

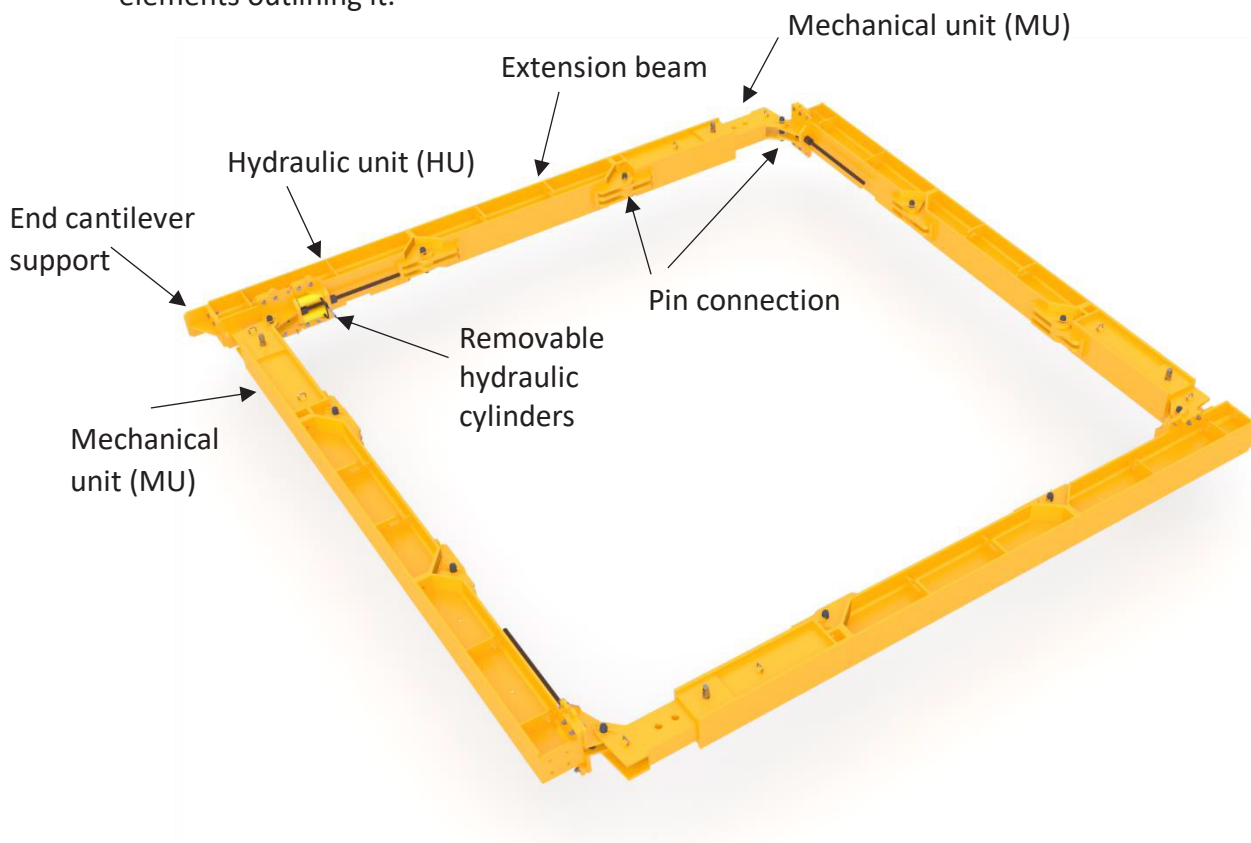
- Always visually inspect the brace before installation for damage.
- The brace should always be installed square and vertical to the excavation walls and to check that there is contact with all the inward facing trench sheet. If this is not possible any gaps must be securely packed by using hardwood wedges.
- Safe access and edge protection (for personnel) and barrier protection (for plant) should always be considered.
- Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
- No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.
- Excavation works must be planned before work starts on site and assessment of risk and hazards must be done.

- Due to high loadings used with this equipment, all application bracing systems should be approved by a competent person.
- All personnel engaged in application of supporting system must be previously briefed and supervised by competent person.
- All lengths of extension are given as pin to pin. Extendable ram section is powered with 700 bar hydraulic jack by hydraulic hoses.
- Weights of elements are indicated on drawings delivered with design.

## 4 Dimensions

Dimensions vary depending on applied bracing system. Information about actual size of used elements can be found in technical documentation for specific working site.

Mechanical and hydraulic units are designed to fit bracing dimension and does not contain elements outlining it.



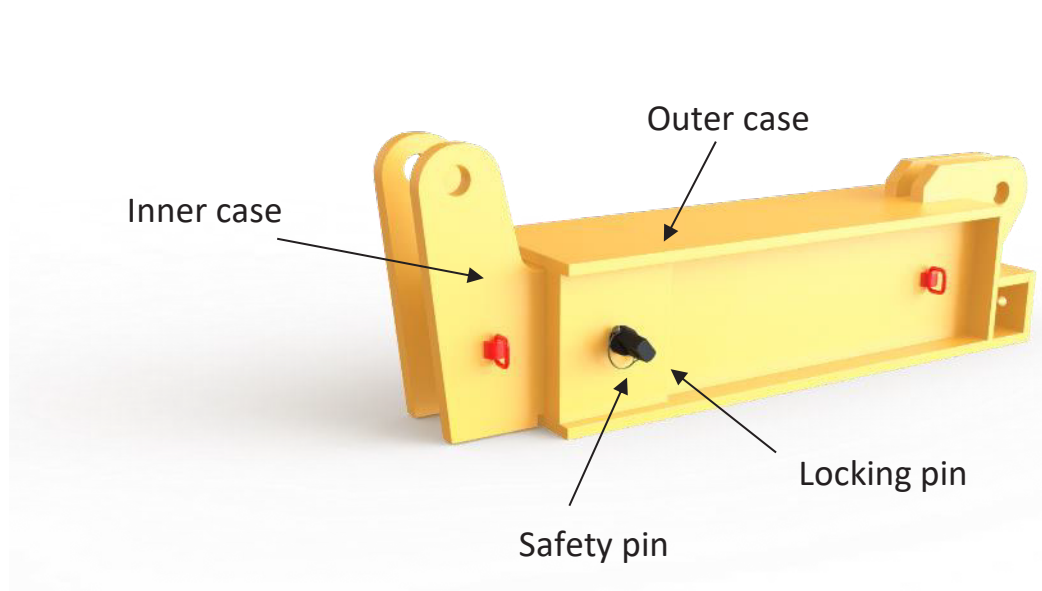
*Fig. 2: Typical frame arrangement*

## 5 Elements identification

### 5.1 Mechanical unit (MU)

#### 5.1.1 Elements

Mechanical unit consists of two cases- inner and outer connected together by locking pin. Locking pin is secured by both sides by safety pin preventing slip off while no tension is applied to element (Fig. 1). Mechanical unit is connected with other elements with pins and 2 PCS M24 bolts.



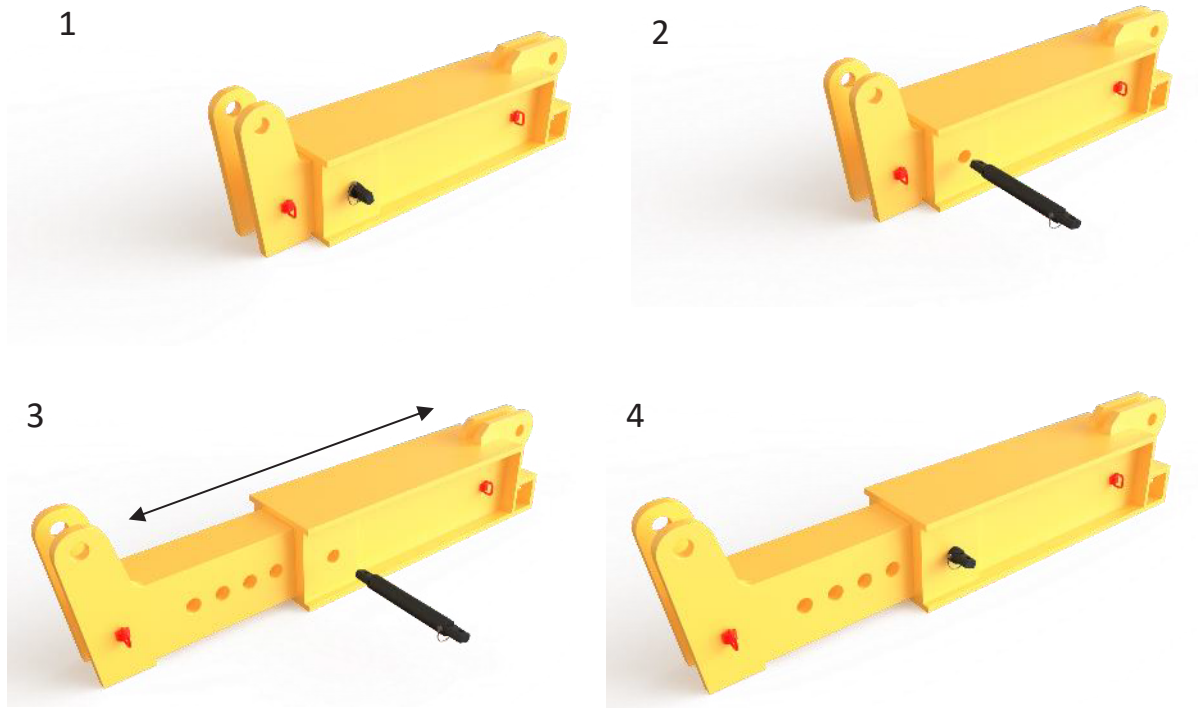
*Fig. 2: Mechanical unit*

Locking pin ends are conically shaped to ease mounting.

Mechanical unit is used to roughly pre-adjust the length of bracing to actual length of sheet pile wall. It does not generate tension on the system.

### 5.1.2 Adjusting

Length of mechanical unit can be adjusted by removing the safety pins and then locking pin (dia. 50mm pin for B300 and dia. 60mm for B400). Cases can be moved to the next position to lock it with the pins in required position specified on excavation shoring drawing. Adjusting procedure is shown on the pictures below (Fig. 2).



*Fig. 3: Adjusting of MU*

Mechanical unit must be inspected every time before installation and during the length adjustment. All structural damages must be reported to competent engineer. Those devices operate under the force up to 100 tons and cannot be used when damaged.

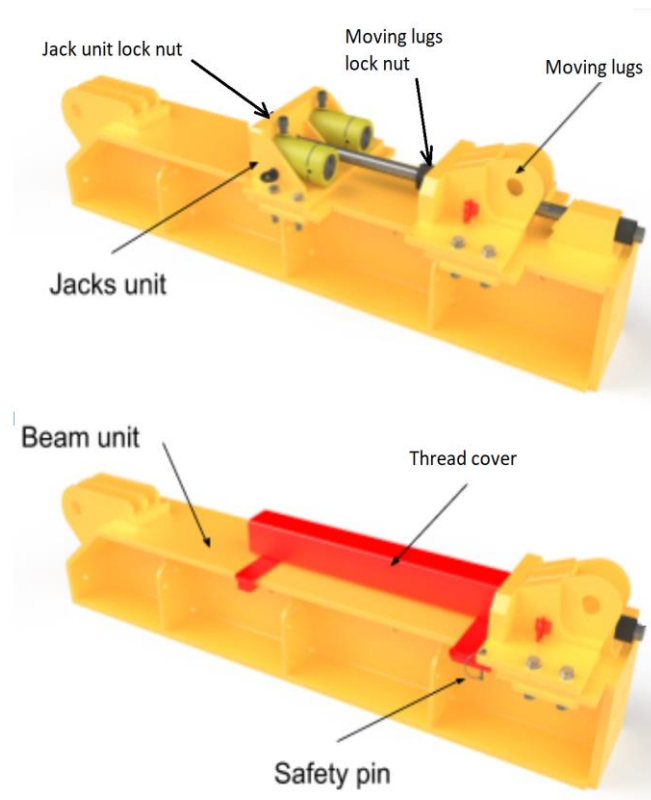
Always ensure that safety pins are properly mounted in place.

## 5.2 Hydraulic unit (HU)

### 5.2.1 Elements

Hydraulic unit consist of (Fig. 3):

- beam unit - main element connected with pin and M24 bolts to bracing system extensions;
- moving lugs - part used to final (fine/precise) length adjustment and load transfer;
- threaded bar cover - mounted to unit after installation to protect it against dirt, concrete and potential damage caused by site equipment;
- jack unit - hydraulic jacks for preliminary tension and final tension release;
- lock nuts - keeps jack unit and moving lugs in set position.
- safety pins - keeping threaded bar cover in place after installation.

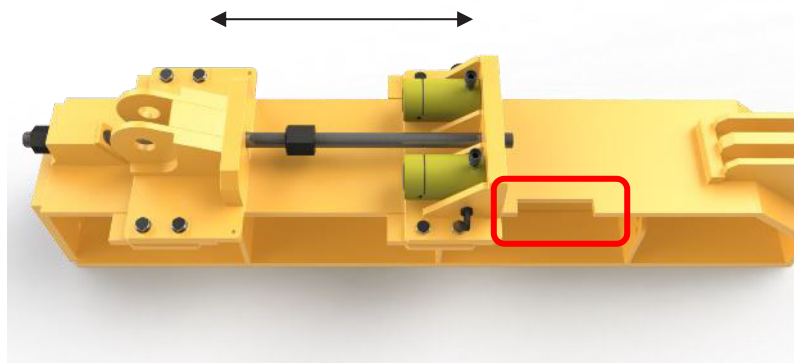


*Fig. 4: Hydraulic unit*



## 5.2.2 Adjusting

Moving lugs are used to set the final (precise) length of the bracing system during the installation process. To change the position nut should be unscrewed. This allows to move the lugs. Jack unit can be mounted without deinstalling its support plates- using beam cut-out (marked with red square on Fig. 4).



*Fig. 5: Adjusting of HU*

## 5.3 Extensions

B300 and B400 series have extensions in lengths 0.5m, 1m, 2m, 3m, 6m and 9m and are connected together and with HU and MU. Each connection consist with 2 PCS M24 nuts and pins secured with R-clips (for B300 a dia. 50mm pin and for B400 a dia. 60mm pin).

Extensions are available in lengths: 0,5 m, 1 m, 2 m, 3 m, 6 m and 9 m for both bracing Series (B300 and B400). They can be connected in any order. Each connection consists of:

- 2 PCS of M24 bolts and nuts
- 1 PC pin secured with R-clips, (for B300 50 mm dia. pin, for B400 60 mm dia. pin)



*Fig. 6: pin connection of extensions*



*Fig. 7: bolt connection of extensions*

## 6 Installation in excavation

Hydraulic and mechanical units are mounted on both ends on every bracing wall and meeting in every corner.

Installation process can be divided to further stages:

### Stage 1:

Prior to installation measure real pit dimensions and adjust Mechanical Unit on ground to length that might be different (in most cases shorter) than length indicated on the design drawing. (Fig. 5.)

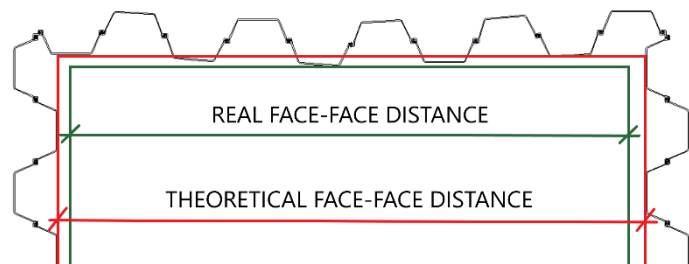


Fig. 8

### Stage 2:

First bracing leg is installed. Mechanical Unit pin axis should be in distance of about 52cm for B400 or 46cm for B300 from adjacent wall face. (Fig. 6.)

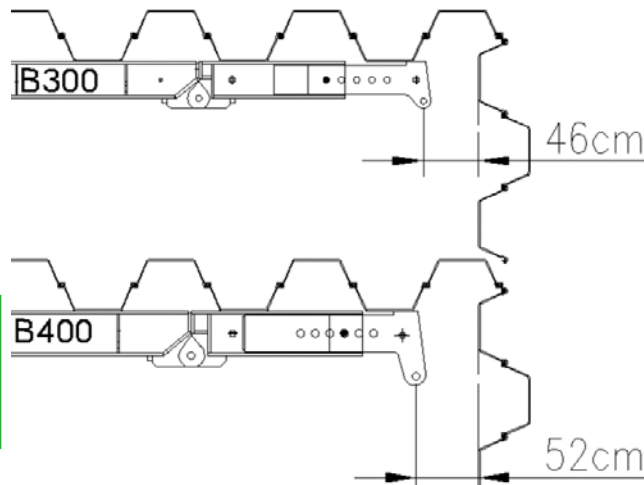


Fig.6

### HINT!

If it is possible start installation from one of the short legs (Fig.7)

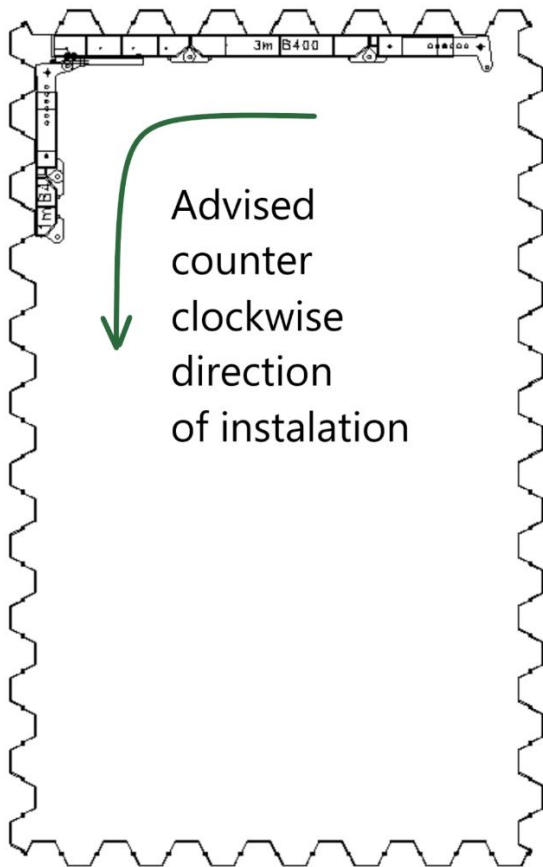


Fig. 7

**Stage 3:**

Second bracing wall is installed.

**HINT!**

**If it is possible install legs in counter clockwise direction (Fig.7)**

Mechanical unit is set according to blueprint lug pin holes of mechanical and hydraulic unit are set concentrical. (Fig. 8.) Locking pin and safety pin are mounted - that way 2 legs are connected in corner.

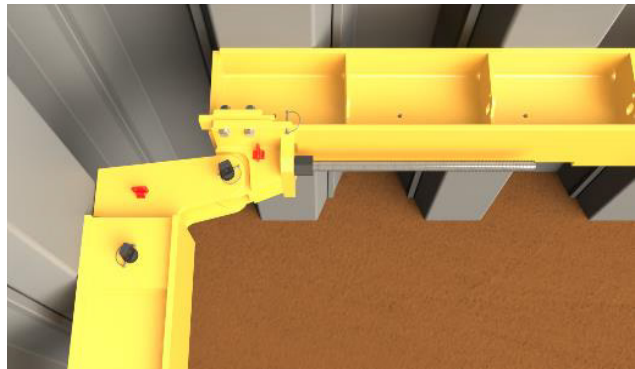
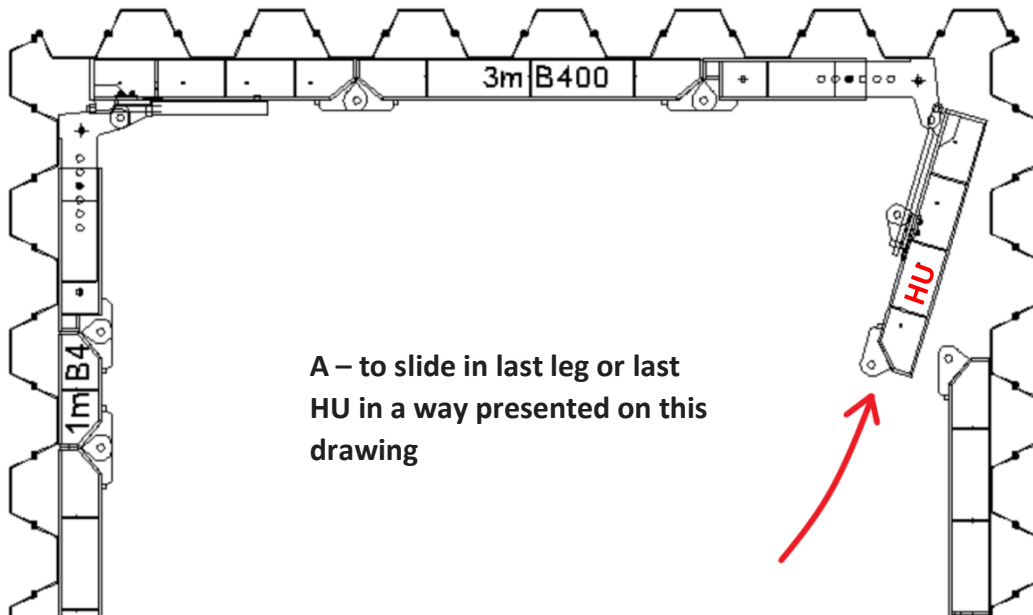


Fig. 8

**Stage 4:**

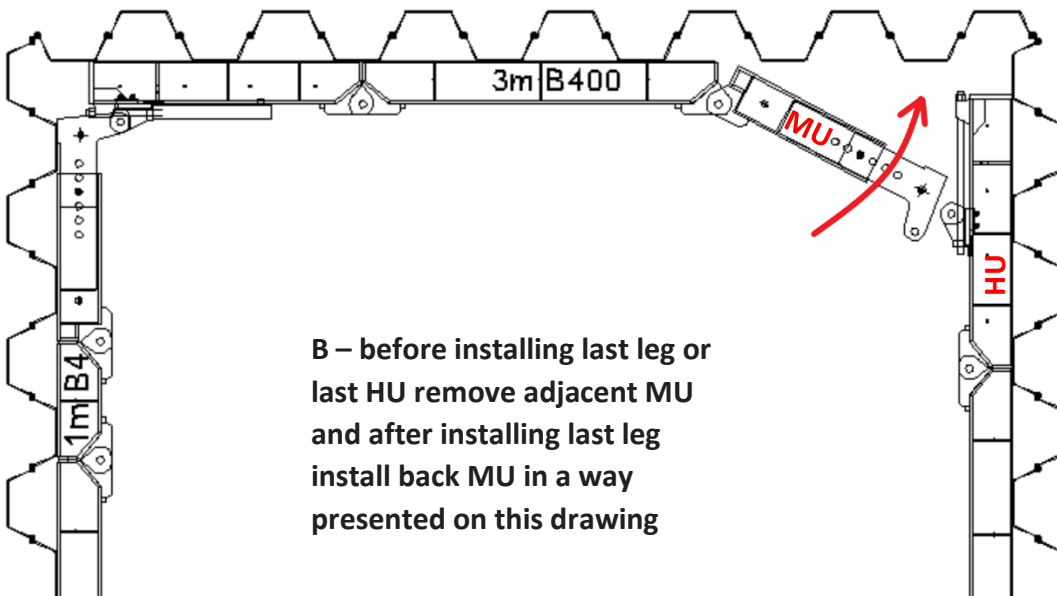
Continue installing other legs.

We propose to install last corner in one of two ways, A or B. (A -Fig. 9, B- Fig. 10).



A – to slide in last leg or last HU in a way presented on this drawing

Fig. 9: way A



B – before installing last leg or last HU remove adjacent MU and after installing last leg install back MU in a way presented on this drawing

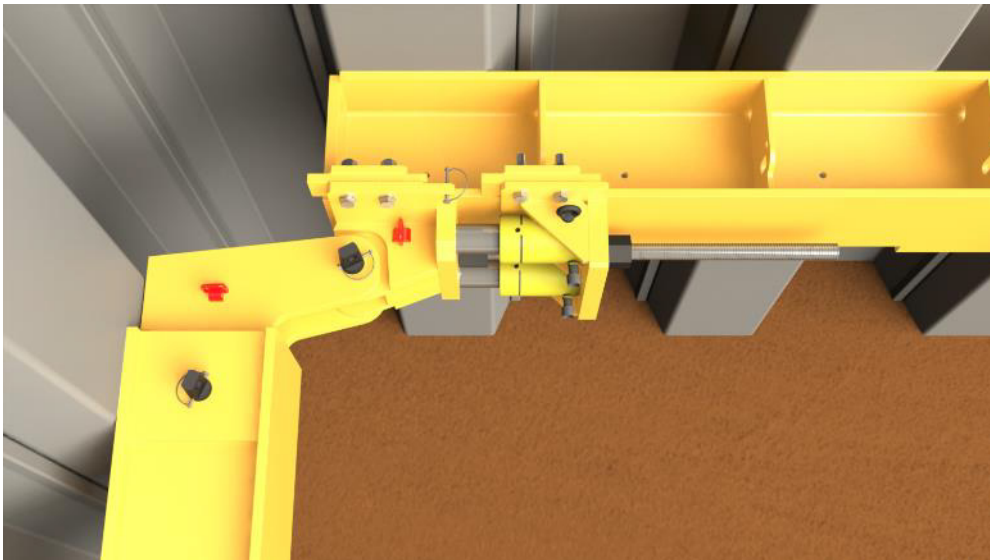
Fig. 10: way B

**Stage 5:**

Before prestressing the system, all legs are installed, hanging on chains and connected with pins and bolts and nuts.

**Stage 6:**

In order to prestress legs jack unit is installed as close as it is possible to moving lugs and set in place with lock nut. Hydraulic hoses are connected and pressure is applied by manual or motorised pump. Moving lugs are set to required position in which the legs perpendicular to hydraulic unit will be touching excavation shoring elements (for example sheet piles) and prestressed with pressure not bigger than 20 Bars and locked with nut. (If preliminary position is not set with one stroke- procedure is repeated until lugs are in positions shown in blueprint). (Fig. 11.)



*Fig. 11*

**WARNING!**

Please control prestress pressure on pressure gauge. Never exceed 20 Bars prestress force. Bigger prestress pressures might be specified by designer if system has to limit deformations of supported wall and settlements on neighbouring buildings. The bigger prestress forces specified by designer also cannot be exceed as it may result in greater soil pressures and system collapse.

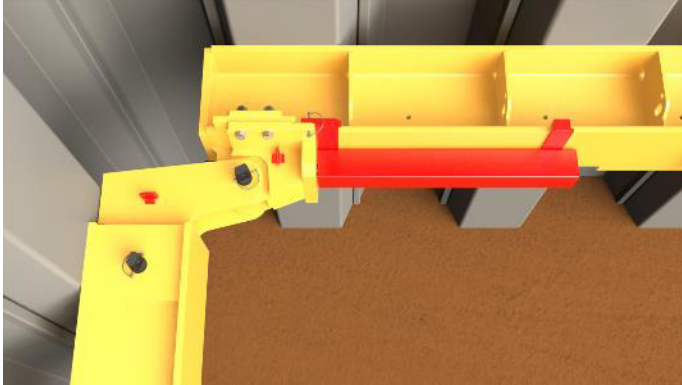


Fig. 12

**Stage 7:**

Jack unit and its lock nut are removed. Thread bar cover is mounted (Fig. 12.). Always make sure that cover is locked with safety pins. Procedure will be repeated on the rest of the walls on working site.

**Stage 8:**

Bracing is ready to work. Excavation can be continued.

## 7 System removal

For removal please follow these steps:

1. Remove threaded bar cover.
2. Install jack unit on hydraulic unit so that cylinder pistons will be in contact with moving lugs.
3. Attach hydraulic hoses.
4. Start pumping until hydraulic cylinders pistons will extract by ca. 80-90 mm (Fig. 13.).
5. On free end of threaded bar turn jack unit lock nut until it will be in contact with jack unit.
6. Start to pump out jack unit with hydraulic pump until the system load on moving ears lock nut will be released.

**WARNING!**

**If on pressure gauge you have reached 700 bars and there is still load on moving ears lock nut it means that there was bigger axial load in system than in design. Please inform designer about this fact!**

**HINT! If load is released and it is not possible to turn moving lugs lock nut, please hit it a little with hammer as it may be clenched on the threaded bar.**

**HINT! If you did not manage to release load from nut, please try to release first load in other hydraulic units.**

7. When load from moving lugs lock nut is released please turn this nut by ca. 70-80mm toward jack unit.

8. Release pressure from jack unit by turning opposite lever on manual pump. Moving lugs will move toward moving lugs lock nut.
9. If moving lugs will again block moving lugs lock nut repeat points 4-8 until load will be fully released.

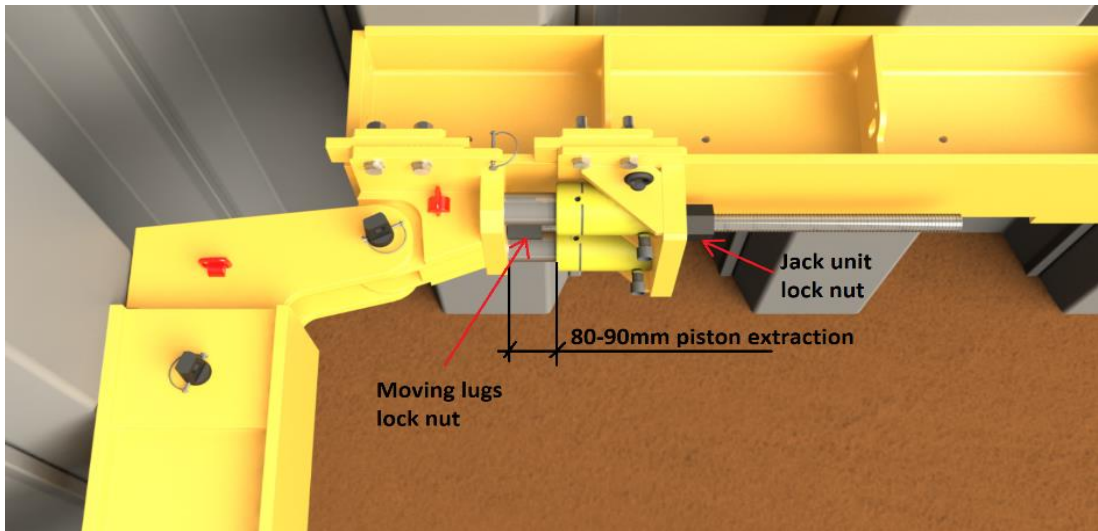


Fig. 13

10. When loads are released in all legs removal of bracing from excavation may start.

**HINT!**

We propose to remove first one of MU in a way proposed on drawing below (Fig. 14)

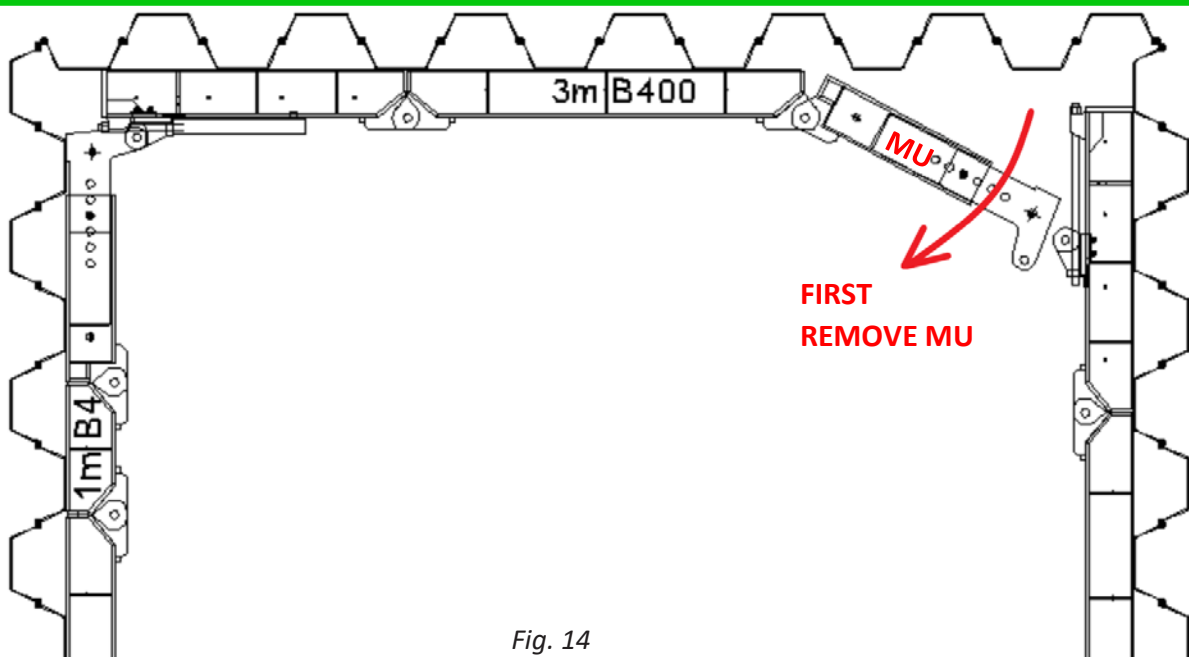


Fig. 14