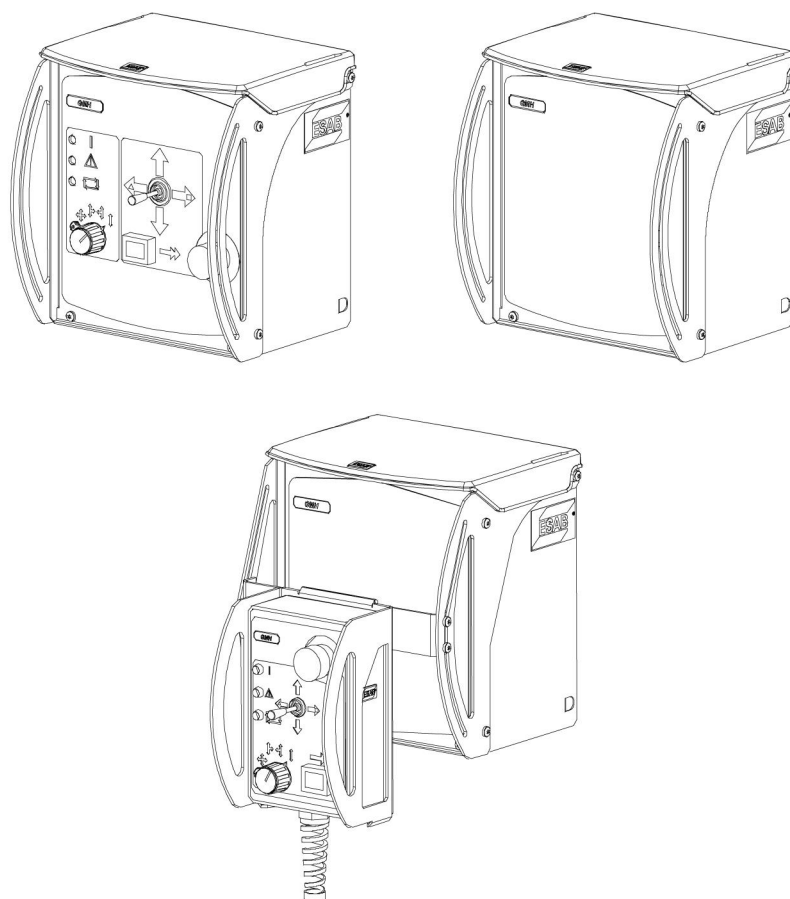


GMH



Instruction manual



EU DECLARATION OF CONFORMITY

According to
The Low Voltage Directive 2014/35/EU
The EMC Directive 2014/30/EU
The RoHS Directive 2011/65/EU

Type of equipment

Arc welding joint tracking unit

Type designation

PAV	serial number starting with 049 XXX XXXX
PAV remote control	serial number starting with 941 XXX XXXX
GMH	serial number starting with 049 XXX XXXX
GMH remote control	serial number starting with 941 XXX XXXX

Brand name or trademark

ESAB

Manufacturer or his authorised representative established within the EEA

Name, address, and telephone No:

ESAB AB
Lindholmsallén 9, Box 8004, SE-402 77 Göteborg, Sweden
Phone: +46 31 50 90 00, www.esab.com

The following harmonised standards in force within the EEA has been used in the design:

EN IEC 60974-1:2018/A1:2019	Arc Welding Equipment – Part 1: Welding Power Sources
EN 60974-10:2014,	Arc Welding Equipment – Part 10: Electromagnetic Compatibility (EMC) requirements

Additional Information:

Restrictive use, Class A equipment, intended for use in location other than residential.

By signing this document, the undersigned declares as manufacturer, or the manufacturer's authorised representative established within the EEA, that the equipment in question complies with the safety requirements stated above.

Place/Date

Signature

A handwritten signature in black ink, appearing to read "Peter Kjällström". The signature is written in a cursive, flowing style.

The CE mark, consisting of the letters "C" and "E" in a stylized, bold font, indicating conformity with European standards.

Gothenburg
2022-02-01

Peter Kjällström
Standard Automation Director

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1 SAFETY

**NOTE!**

The unit is tested by ESAB in a general set-up. The responsibility for safety and function, of the specific set-up, lies with the integrator.

Users of ESAB equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well-acquainted with the operation of the equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

1. Anyone who uses the equipment must be familiar with:
 - its operation
 - location of emergency stops
 - its function
 - relevant safety precautions
 - welding and cutting or other applicable operation of the equipment
2. The operator must ensure that:
 - no unauthorised person is stationed within the working area of the equipment when it is started up
 - no-one is unprotected when the arc is struck or work is started with the equipment
3. The workplace must:
 - be suitable for the purpose
 - be free from drafts
4. Personal safety equipment:
 - Always wear recommended personal safety equipment, such as safety glasses, flame-proof clothing, safety gloves
 - Do not wear loose-fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns
5. General precautions:
 - Make sure the return cable is connected securely
 - Work on high voltage equipment **may only be carried out by a qualified electrician**
 - Appropriate fire extinguishing equipment must be clearly marked and close at hand
 - Lubrication and maintenance must **not** be carried out on the equipment during operation

**WARNING!**

Risk of crushing when replacing the wire bobbin! Do **not** use safety gloves when inserting the welding wire between the feed rollers.

**WARNING!**

Arc welding and cutting can be injurious to yourself and others. Take precautions when welding and cutting. Ask for your employer's safety practices which should be based on manufacturers' hazard data.

ELECTRIC SHOCK - Can kill

- Install and earth the unit in accordance with applicable standards
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing
- Insulate yourself from earth and the workpiece
- Ensure your working stance is safe

FUMES AND GASES - Can be dangerous to health

- Keep your head out of the fumes
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area

ARC RAYS - Can injure eyes and burn skin

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing
- Protect bystanders with suitable screens or curtains

FIRE HAZARD

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby

NOISE - Excessive noise can damage hearing

- Protect your ears. Use earmuffs or other hearing protection.
- Warn bystanders of the risk

MALFUNCTION - Call for expert assistance in the event of malfunction.

Read and understand the instruction manual before installing or operating.

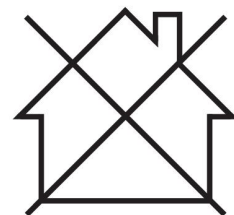
PROTECT YOURSELF AND OTHERS!

**CAUTION!**

This product is solely intended for arc welding.

**CAUTION!**

Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility of class A equipment in those locations, due to conducted as well as radiated disturbances.

**CAUTION!**

Read and understand the instruction manual before installing or operating.





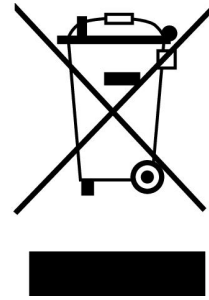
NOTE!

Dispose of electronic equipment at the recycling facility!

In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment and its implementation in accordance with national law, electrical and/or electronic equipment that has reached the end of its life must be disposed of at a recycling facility.

As the person responsible for the equipment, it is your responsibility to obtain information on approved collection stations.

For further information contact the nearest ESAB dealer.



ESAB can provide you with all necessary welding protection and accessories.

2 INTRODUCTION

2.1 General

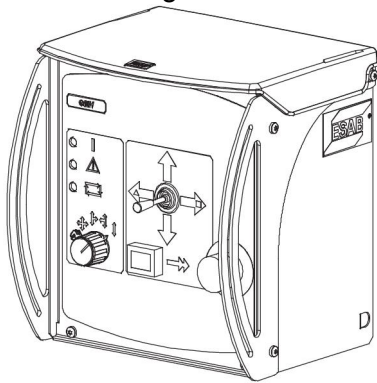
GMH is joint-tracking equipment for the positioning and joint-tracking of automatic welding equipment in all types of joint that arise where the sensor finger has a guiding edge to follow.

The equipment is adapted to ESAB standard servo slides and control one or two servo motors simultaneously.

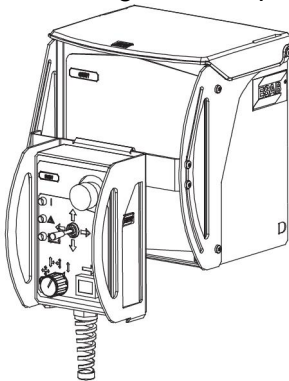
The system is available in several variants, see below.

2.1.1 Variants

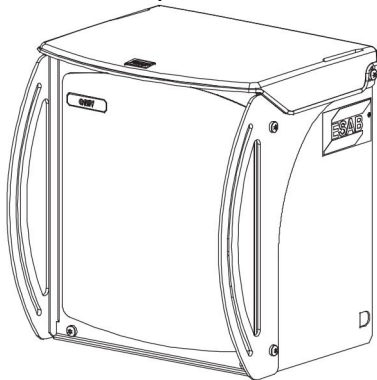
- Joint-tracking unit with control panel.



- Joint-tracking unit with portable control box.



- Built-in component for columns and booms.



3 TECHNICAL DATA

	GMH
Supply voltage	42 V AC, 50–60 Hz
Current output	450 V A
Ambient temperature	-15 – +45 °C (+5 – +113 °F)
Relative atmospheric humidity	Maximum 98%
Maximum motor current	6 A - 100%
Enclosure class	IP23
Current limits	15 A (hardware current limit)
Power supply fusing	10 A slow
Motor regulator, type	Switched four quadrant regulator
Rotor voltage	40 V DC
Field voltage, separate magnetised motor	60 V DC
Weights:	
Joint-track unit	6.2 kg (13.67 lb.)
Portable control box	2.7 kg (5.95 lb., complete with 4 m cable and protection)
Sensor and slide cross with bracket	2.2 kg (4.85 lb.)
Guide finger	0.6 kg (1.32 lb)
Working range sensor, radially 360°	4 mm (0.16 in.)

Enclosure class

The **IP** code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water.

Equipment marked **IP23** is intended for indoor and outdoor use.

Working range and setting speed, see the illustration below and technical description in operating instruction for A6 slide.

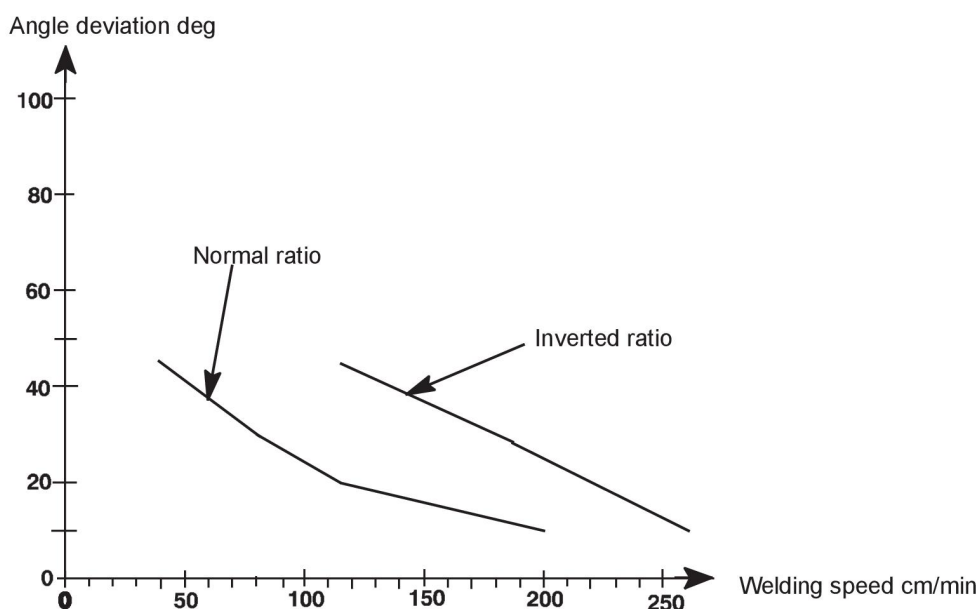


Diagram of the weld joint's maximum angle deviation in relation to the set welding speed.

4 INSTALLATION

The installation must be carried out by a professional.

4.1 Installation and connection

1. Measurement information, see "DIMENSION DRAWING" chapter.
2. Connections, see the "WIRING DIAGRAM" chapter.
3. Check that the required output and voltage is available for complete installation.
4. Fit the guide finger parallel with the motor driven slide cross.

4.2 Tuning the sensor finger

Contact authorised ESAB service personnel for tuning the sensor finger.

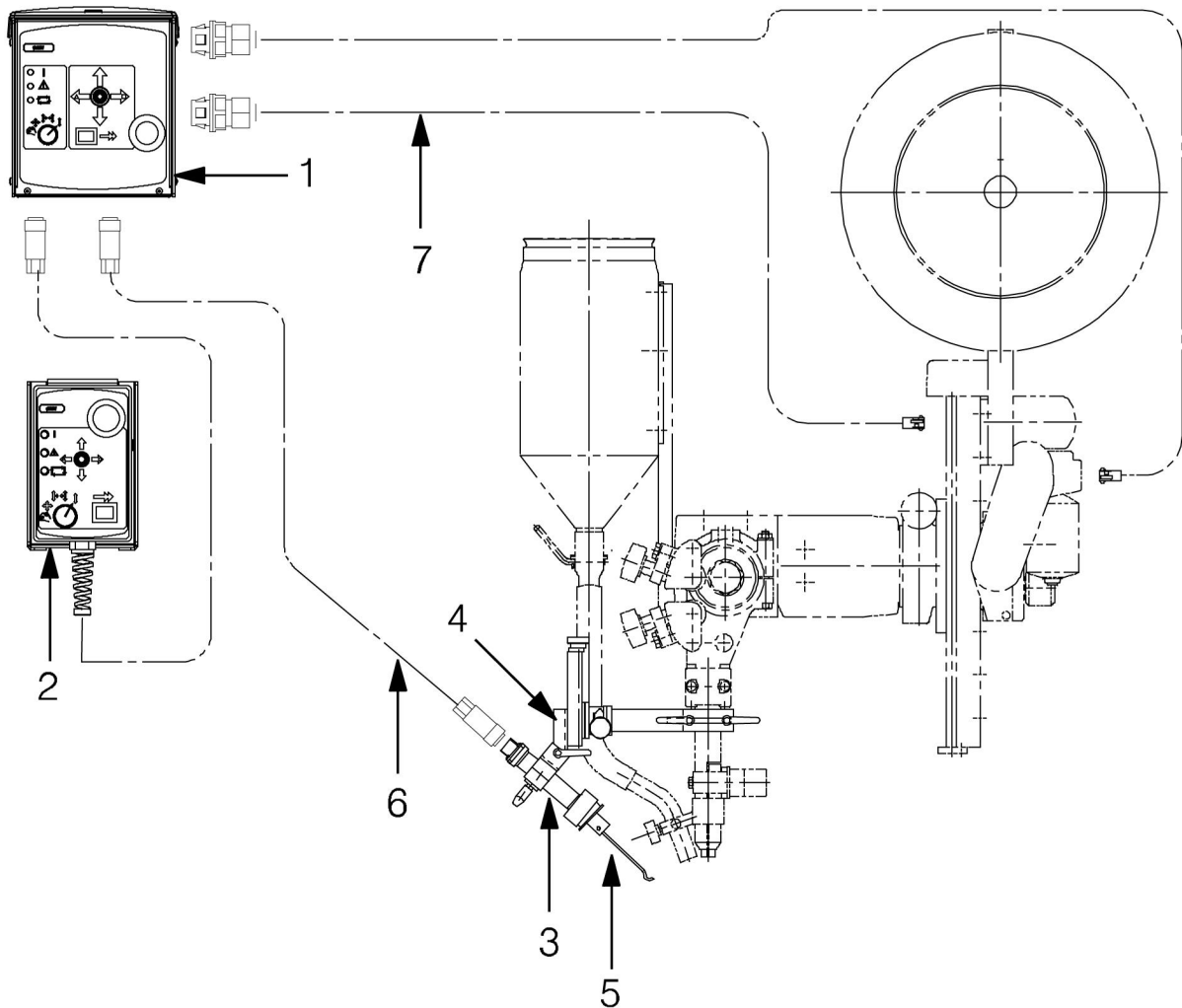
4.3 Tuning the inductive sensor

Contact authorised ESAB service personnel for tuning the inductive sensor.

5 OPERATION

General safety regulations for handling the equipment can be found in the "SAFETY" chapter of this manual. Read it through before you start using the equipment!

5.1 Main parts



- | | |
|--|--|
| 1. Joint-tracking unit (with or without control panel) | 5. Guide finger |
| 2. Portable control box | 6. Control cable (2 m) |
| 3. Sensor | 7. Motor cable (see "ACCESSORIES" chapter) |
| 4. Slide cross for sensor | |

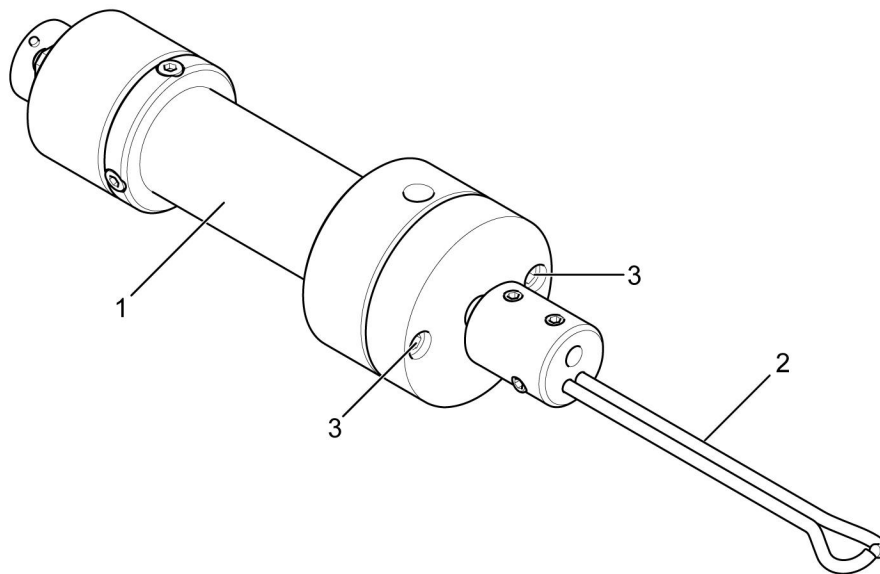


NOTE!

The portable control box (2) and the control cable (6), in accordance with the above, are discontinued for certain columns and booms and are replaced by product specific parts.

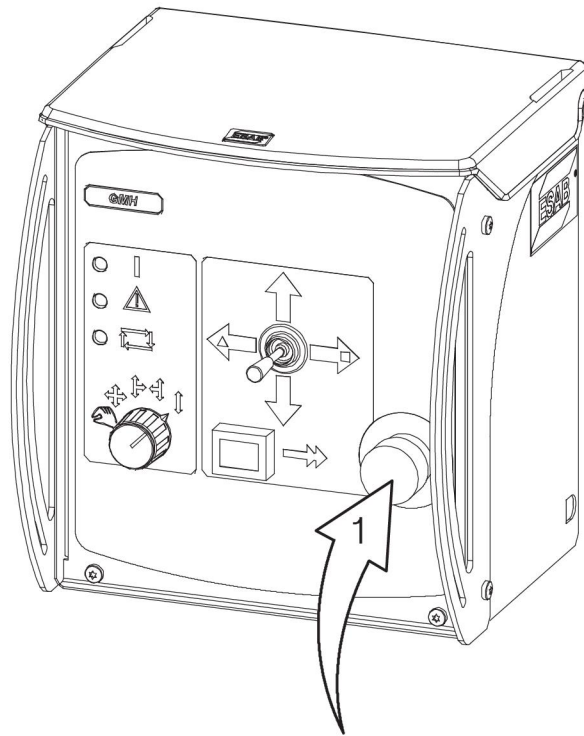
5.1.1 Sensor

The sensor is shaped like a finger. The finger is spring-loaded so that it attempts to reach the centre position laterally and downwards vertically.



1. Sensor with connection for cable to joint-tracking unit and with bracket for different tracking fingers at the front
2. Joint-tracking fingers
3. Stop screws (two) for adjusting finger movement horizontally. The screws enable settings for different joint types

5.2 Joint-tracking unit with control panel



Emergency stop (1)



One press on the button activates EMERGENCY STOP.





NOTE!

An emergency stop must never be reset before the cause of the abnormal function or signal has been established and rectified.



Signal lamp

  Illuminates when the power has been switched on.

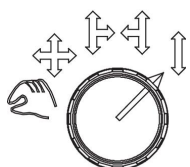
Alarm lamp (automatic joint-tracking)

  Illuminates when the guide finger is outside the working range (vertical). The automatic function is then blocked.






Signal lamp (joint-tracking)

  Illuminates when automatic joint-tracking is in progress.

Switch with 5 positions



Selection of joint-tracking and joint-searching options:

-  Manual preset
-  Vertical and horizontal joint-tracking
-  Vertical and horizontal joint-tracking with joint-searching to the right
-  Vertical and horizontal joint-tracking with joint-searching to the left
-  Vertical joint-tracking

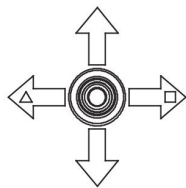


NOTE!

If the switch is in a joint-tracking position when the equipment is switched on then the equipment will not start joint-tracking for safety reasons.

To start joint-tracking, another position must be briefly selected before returning to the required position.

Control lever



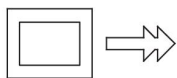
Manual control of servo slides Up/Down and Left/Right.

The control lever is always overriding.

When the **Alarm lamp** is illuminated the downward manual movement is blocked.






Lamp pushbutton (rapid speed)

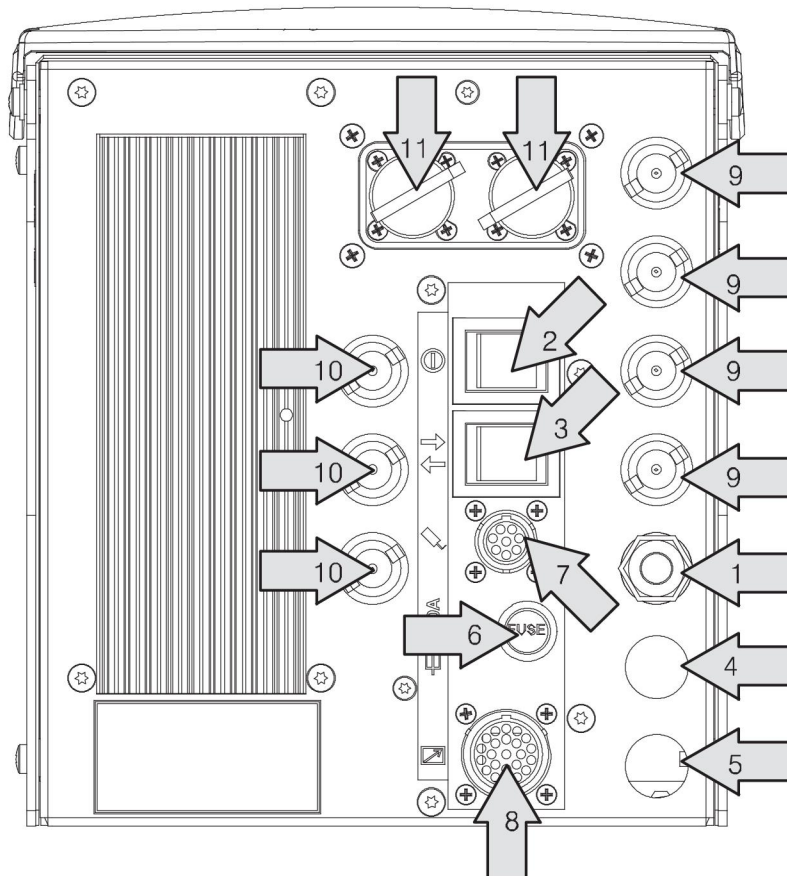
Selection of low or high speed during manual positioning with the control lever.



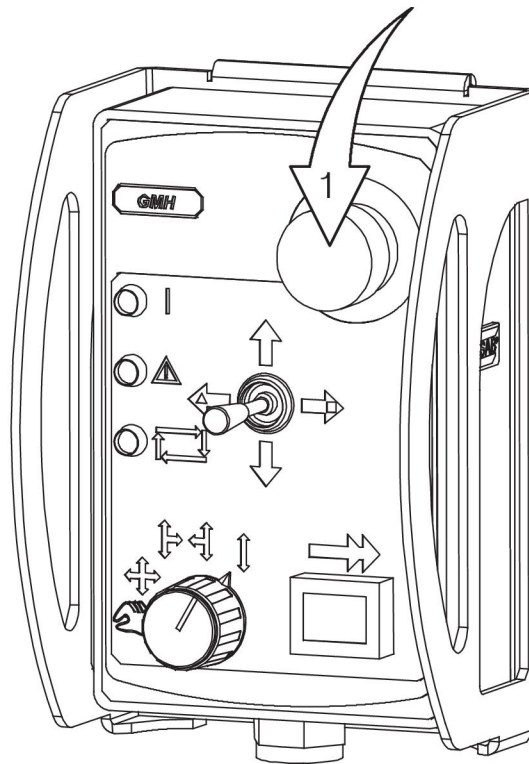
- One press on the button activates rapid speed.
A lamp in the button illuminates when the function is activated.
- Return to low speed by pressing the button again.
Check that the lamp has gone out before carrying out further commands.

5.3 Joint-tracking unit - rear section

1		Connection, power supply 42 V
2		Switch Power supply On/Off
3		Switch For switching the horizontal slide motor's direction of movement
4		Socket, for connecting the vertical slide motor
5		Socket, for connecting the horizontal slide motor
6		Control fuse, 10 A slow
7		Sleeve socket (8-pin), for connecting the guide finger
8		Socket (23-pin), for connecting the portable control box
9		Sockets, for connecting the limit position switch
10		Extra sockets
11		Service contacts



5.4 Portable control box



Emergency stop (1)

One press on the button activates EMERGENCY STOP.



NOTE!

An emergency stop must never be reset before the cause of the abnormal function or signal has been established and rectified.

Signal lamp



Illuminates when the power has been switched on.

Alarm lamp (automatic joint-tracking)



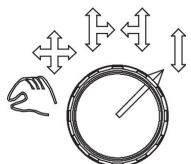
Illuminates when the guide finger is outside the working range (vertical). The automatic function is then blocked.

Signal lamp (joint-tracking)








Illuminates when automatic joint-tracking is in progress.

Switch with 5 positions



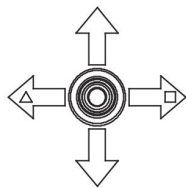
Selection of joint-tracking and joint-searching options:

-  Manual preset
-  Vertical and horizontal joint-tracking
-  Vertical and horizontal joint-tracking with joint-searching to the right
-  Vertical and horizontal joint-tracking with joint-searching to the left
-  Vertical joint-tracking

**NOTE!**

If the switch is in a joint-tracking position when the equipment is switched on then the equipment will not start joint-tracking for safety reasons.

To start joint-tracking, another position must be briefly selected before returning to the required position.

Control lever

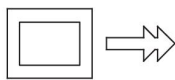
Manual control of servo slides Up/Down and Left/Right.

The control lever is always overriding.

When the **Alarm lamp** is illuminated the downward manual movement is blocked.

Lamp pushbutton (rapid speed)

Selection of low or high speed during manual positioning with the control lever.



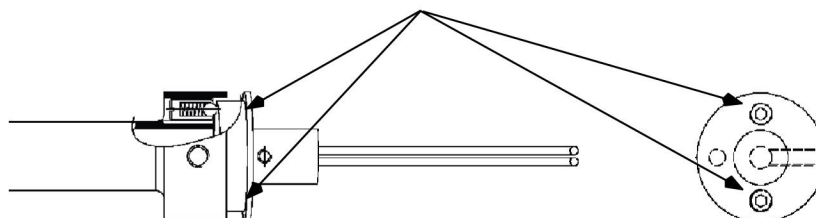
- One press on the button activates rapid speed.
A lamp in the button illuminates when the function is activated.
- Return to low speed by pressing the button again.
Check that the lamp has gone out before carrying out further commands.

5.5 Joint-tracking

The joint-tracking equipment can be set for different types of joint-tracking. It can be set for joint-tracking with edge control and for joint-tracking with groove control. The setting is made both on the control box and on the sensor.

5.5.1 Joint-tracking with edge control

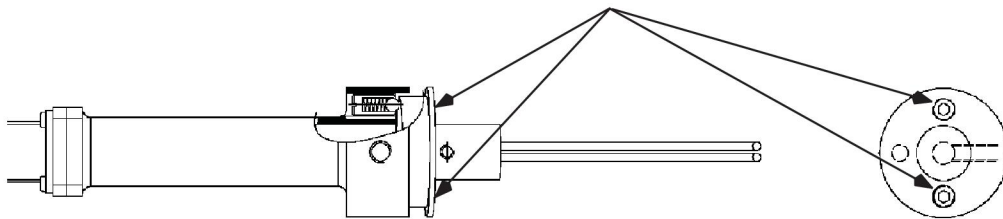
The following functions are set on the control box, *vertical and horizontal joint-tracking with joint-searching to the right* or *vertical and horizontal joint-tracking with joint-searching to the left* depending on whether right or left-hand control is required. The two stop screws on the sensor must be screwed in to the stop point. See the illustration below. This means that the fuses are spring-loaded laterally and edge control is allowed. Joint-tracking with edge control is used for welding fillet welds and similar joints, see also the joint table on page.



The stop screws are tightened to the stop point.

5.5.2 Joint-tracking with groove control













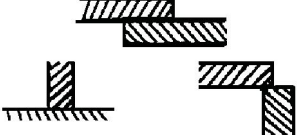

The following functions are set on the control box, *vertical and horizontal joint-tracking* or *vertical joint-tracking* depending on whether both vertical and lateral control or just vertical control are required. The stop screws on the sensor must be screwed out at least two turns or to the stop point, see the illustration below. This releases the spring loading for the search fingers laterally and enables groove control. If the stop screws are not screwed out then there is a risk that the search fingers start to "climb" up the joint walls in shallow V and U-joints. See table below for selection of setting.



The stop screws screwed out 2 turns

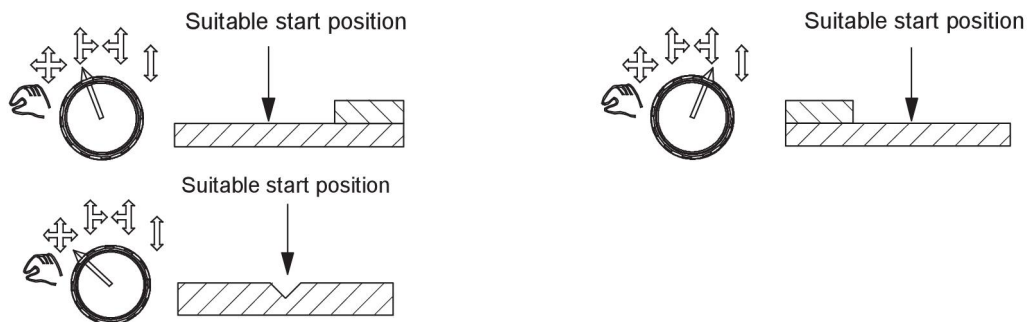
Examples of different types of joint and of the guide finger's application against the guiding edges.

	Joint type	Setting, control box
Double flanged butt weld		
I-weld (A=guide bar)		
V-weld		
1/2 V-weld		
1/2 V-weld		
U-weld		
Double U-weld		

	Joint type	Setting, control box
J-weld		
Double J-weld		
X-weld		
Asymmetrical X-weld		
K-weld		
K-weld		
Fillet weld		

5.6 Positioning for welding start

1. Align the welding equipment into position in relation to the weld joint so that the working range of the slide cross covers the whole height and lateral deviation of the joint from starting point to the stopping point for welding.
2. Set the *switch* in the required joint-tracking position.
3. Operate the guide finger horizontally using the *control lever*, until the finger is above a suitable start position, see the illustration below.
For vertical joint-tracking along the guide finger is positioned where the start of the weld is required to be.
4. Operate the welding head downwards with the *control lever*, until the *signal lamp* goes out.
The equipment now searches for the ideal position itself vertically and horizontally if horizontal joint-tracking is activated.



For fine adjustment of the welding head position, use the slide cross for the sensor.

5.7 Positioning for welding start (with inductive joint-tracking)

The product must be configured before inductive joint-tracking is possible. Contact authorised ESAB service personnel for configuration.

1. Align the welding equipment into position in relation to the weld joint so that the working range of the slide cross covers the whole height and lateral deviation of the joint from starting point to the stopping point for welding.
2. Set the *switch* in the vertical joint-tracking position.
3. Position the sensor downwards with the *control lever*, until the *signal lamp* goes out.
The equipment now searches for the ideal position itself vertically.



NOTE!

If only vertical joint-tracking is used, skip the following points.

4. Set the *switch* in the vertical-right joint-tracking position.
5. Position the sensor using the *control lever* horizontally to the ideal position until the *signal lamp* goes out.
6. The *signal lamp* goes out. The equipment searches for the ideal position itself horizontally and vertically. If the signal lamp does not go out repeat the procedure from Step 1.
7. For fine adjustment of the welding head position, use the slide cross for the sensor.

6 MAINTENANCE

6.1 General



NOTE!

All warranty undertakings given by the supplier cease to apply if the customer attempts to rectify any faults on the equipment during the warranty period.

- Check daily that the guide fingers are not worn or damaged.
- Clean the sensor with compressed air regularly.
- Follow the instructions for the internal components.
- Contact authorised ESAB service personnel for tuning the system.

7 ORDERING SPARE PARTS



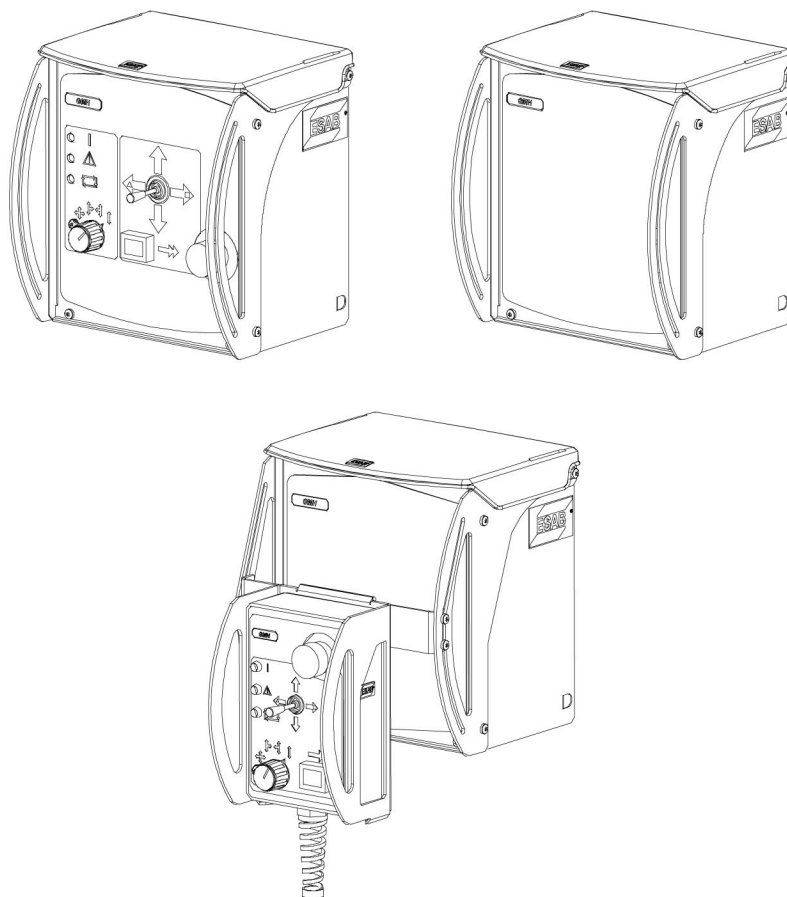
CAUTION!

Repair and electrical work should be performed by an authorised ESAB service technician. Use only ESAB original spare and wear parts.

GMH is designed and tested in accordance with the international and European standards **XXX** and **XXX**. On completion of service or repair work, it is the responsibility of the person(s) performing the work to ensure that the product still complies with the requirements of the above standards.

Spare parts and wear parts can be ordered through your nearest ESAB dealer, see [esab.com](https://www.esab.com). When ordering, please state product type, serial number, designation and spare part number in accordance with the spare parts list. This facilitates dispatch and ensures correct delivery.

ORDERING NUMBERS



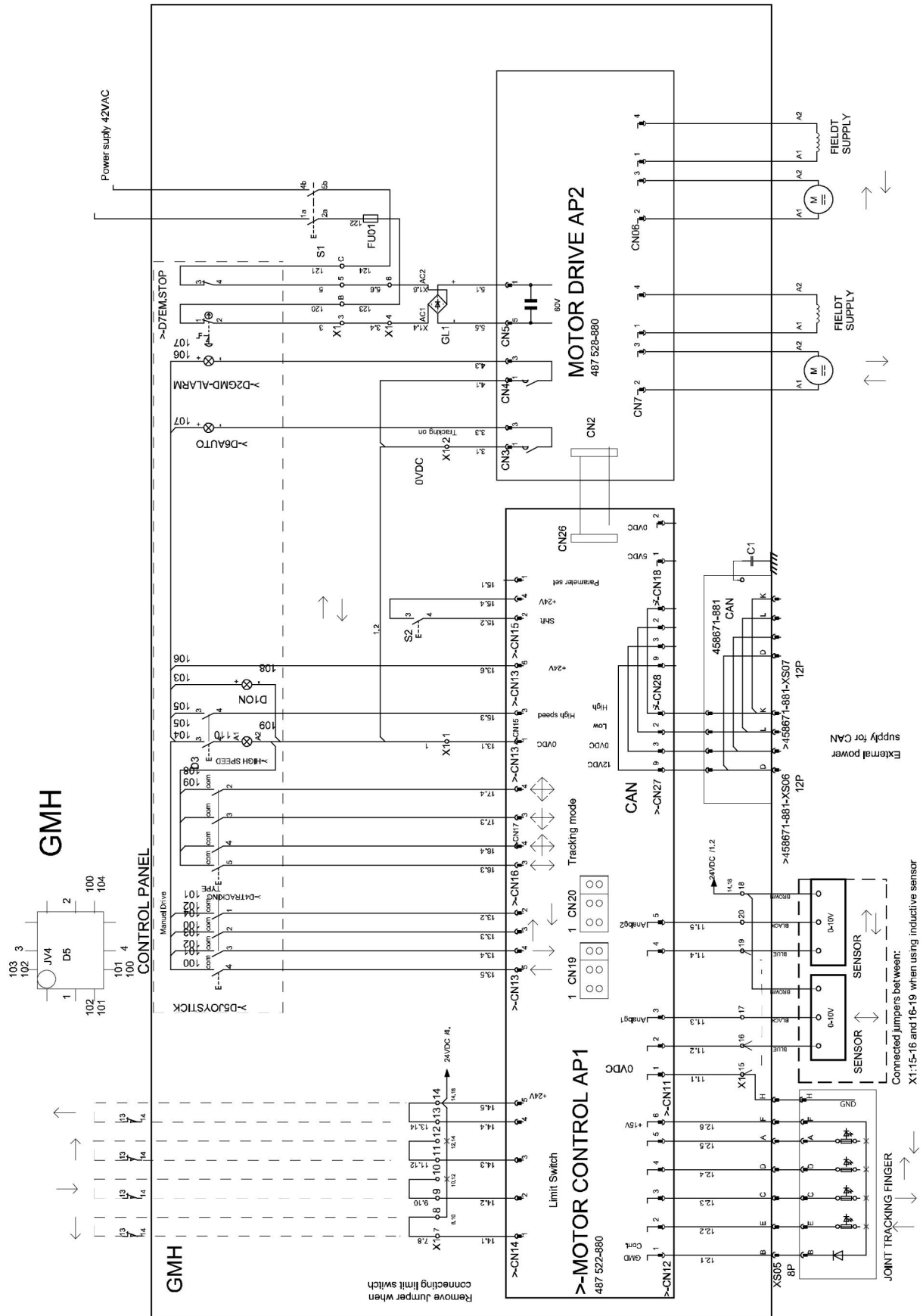
Ordering number	Denomination	Notes
0460 503 880	GMH complete	Joint tracking unit without control panel
0460 503 881	GMH with MMC complete	Joint tracking unit with control panel
0460 698 880	GMH with portable control box	Joint tracking unit without control panel and with portable control box
0460 570 880	Portable control box	
0416 688 881	Sensor	Generation 2
0416 739 880	Slide cross for sensor	
0821 425 880	Slide cross for sensor and laser lamp	
0460 671 *	Instruction manual	
0463 694 001	Spare parts list	

The three last digits in the document number of the manual show the version of the manual. Therefore they are replaced with * here. Make sure to use a manual with a serial number or software version that corresponds with the product, see the front page of the manual.

Technical documentation is available on the Internet at: <http://manuals.esab.com>.

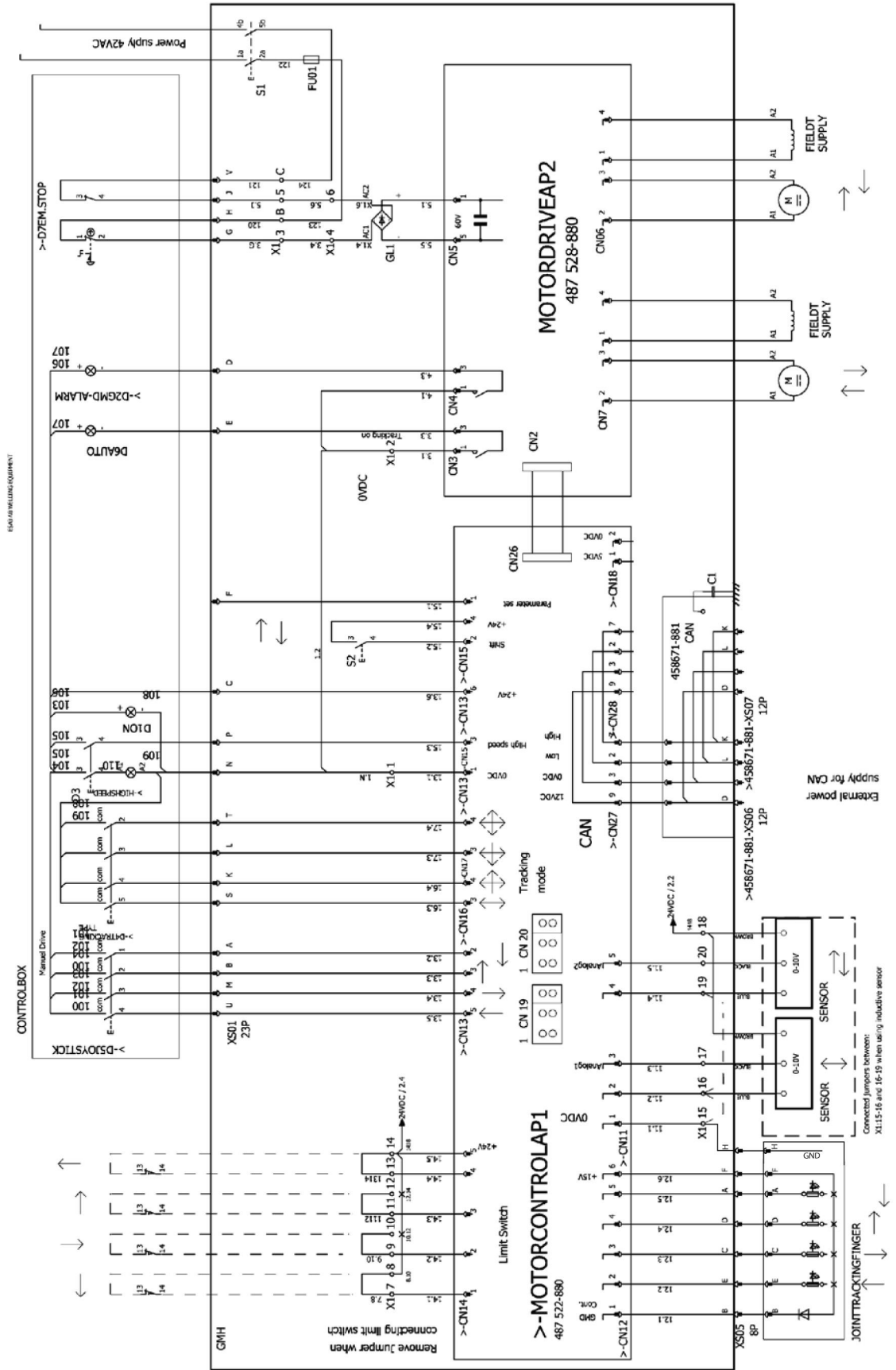
WIRING DIAGRAM

GMH with control panel



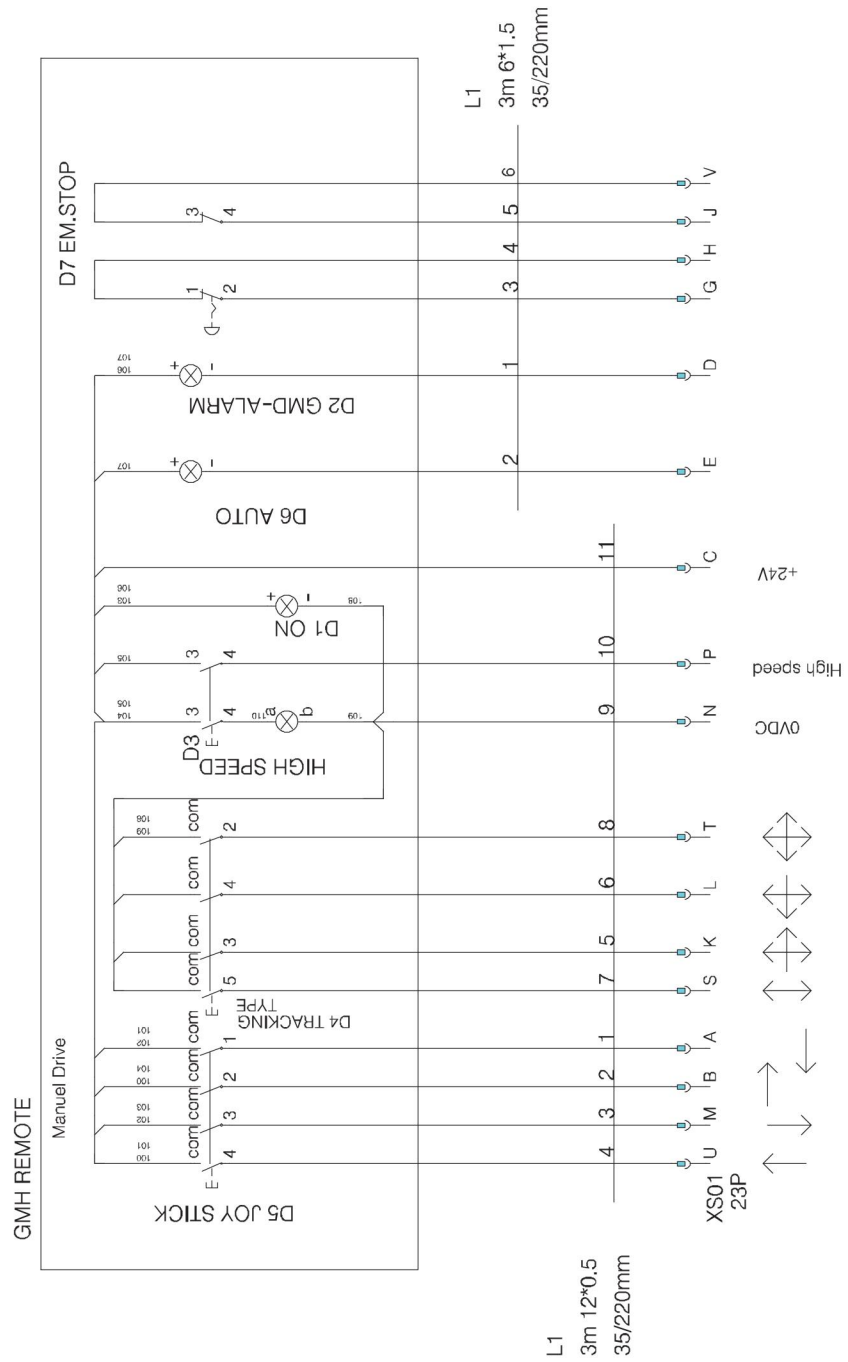
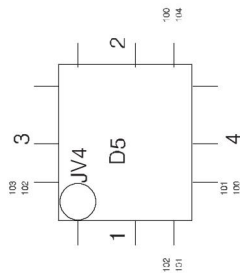
GMH with portable control box

GMH

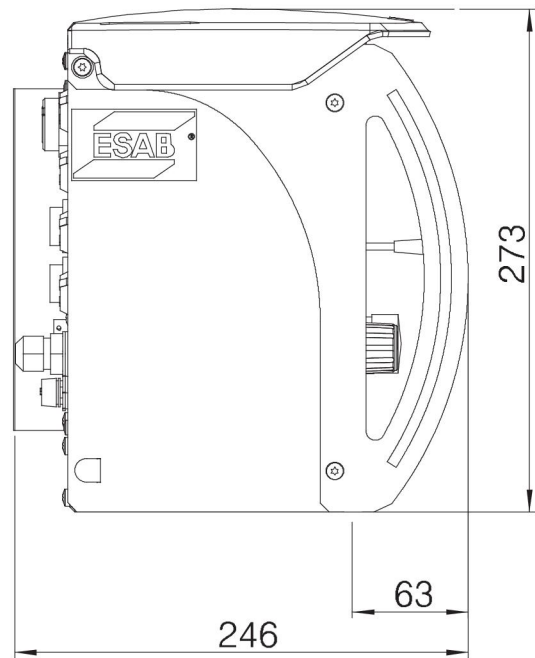
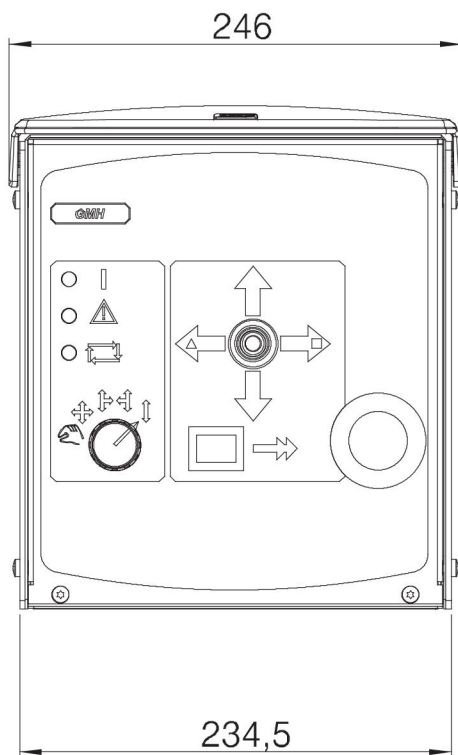
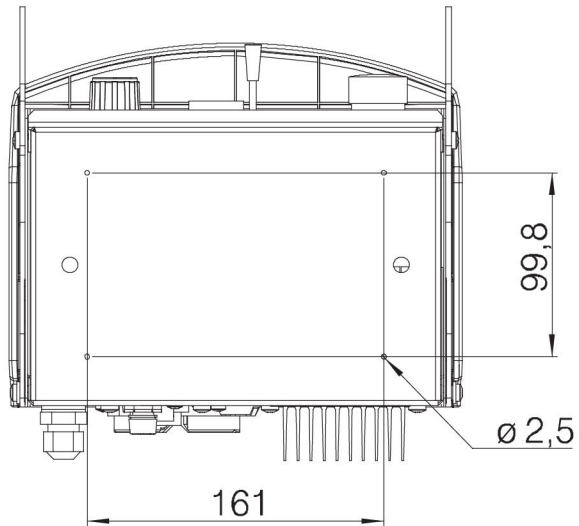


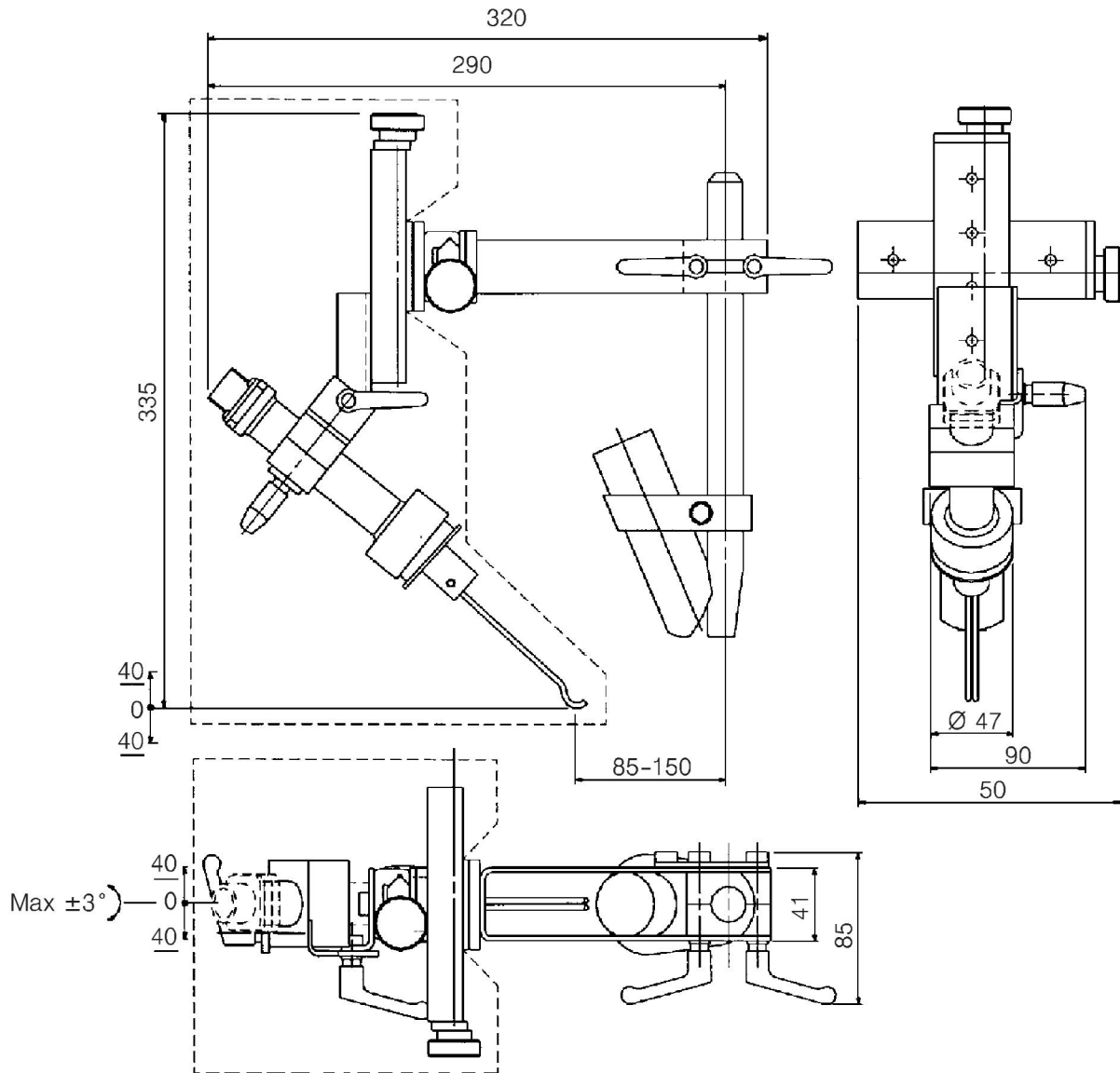
GMH, Portable control box

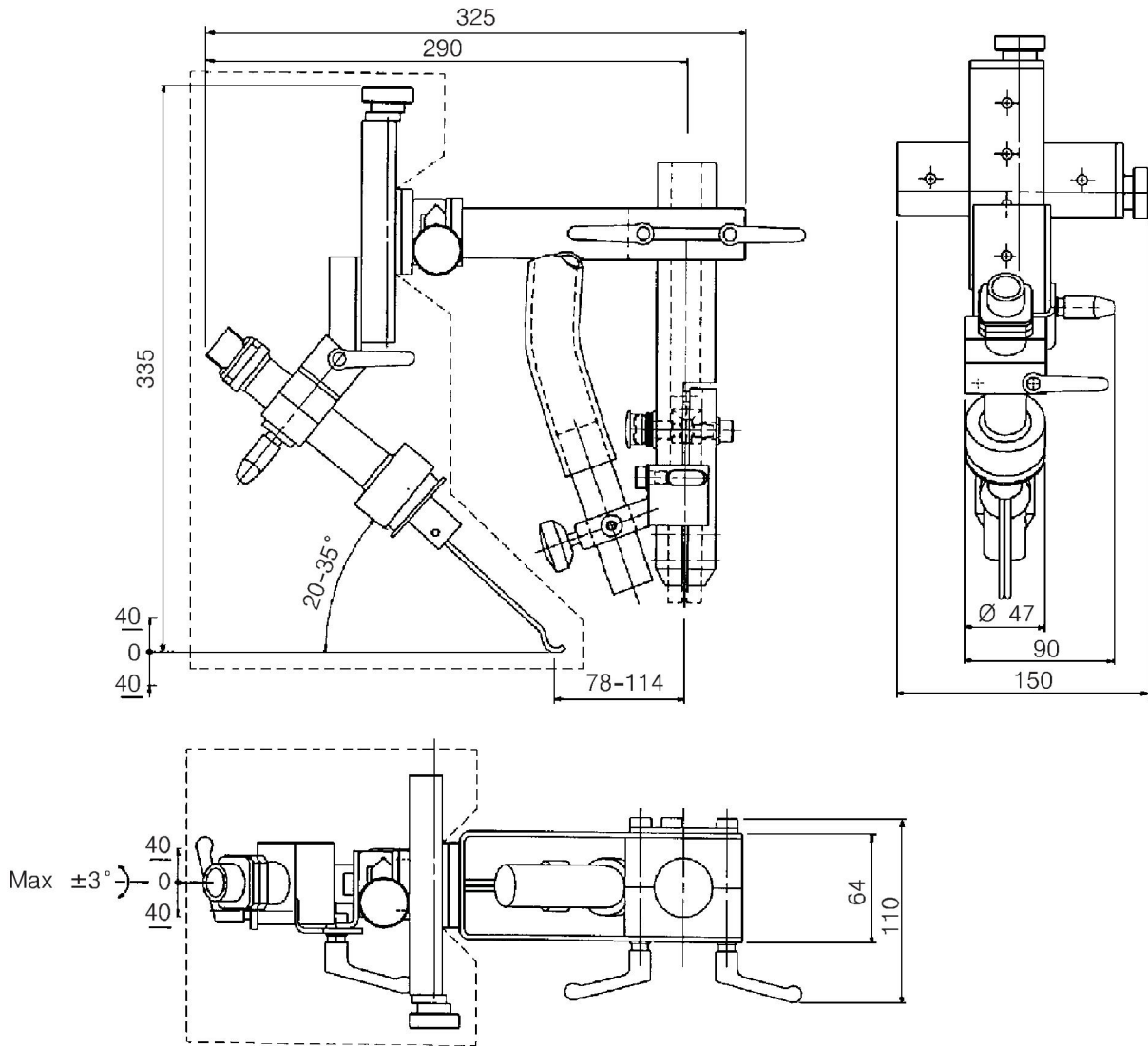
GMH REMOTE



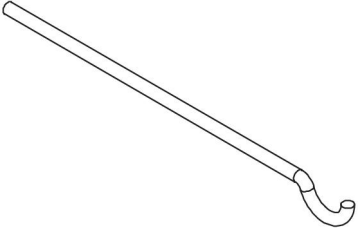
DIMENSION DRAWING








WEAR PARTS

Part number	Denomination	
146 586-001	Tracking fingers	

ACCESSORIES

Ordering number	Denomination	Notes
0148 636 002	Intermediate transformer for separate power supply	From mains power 190, 220, 380, 415, 440, 500 V 50 Hz 200, 230, 380 415, 440, 500 V 60 Hz to secondary 42 V, 660 V A.
0262 613 404	Cable	3×2.5 mm ² , connection, transformer
0334 333 xxx	A6 servo slide ball bushing type	With permanent magnetised motor 42 V DC
0334 426 xxx	A6 motor driven slide, slide bearing mounted long runner	With A6 VEC motor 42 V - 4000 rpm ratio 74:1
0460 745 xxx	Motor cable	Available in different lengths, see sales brochure for the servo slide (contact ESAB sales office)
0416 719 001	Finger with ball	L=100 mm
0418 091 880	Finger	For internal and external corner
0417 346 887	Sensor cable with 90° contact	2 m
0412 013 001	Protective rubber bellows	
0433 762 xxx	Console for control box	Available in different versions
0460 861 880	Counterbalance plate for cables	

Control cable between GMH and joint tracking finger

0416 749 980	Control cable 19 m	
0416 749 981	Control cable 22 m	
0416 749 982	Control cable 25 m	
0416 749 983	Control cable 28 m	
0416 749 984	Control cable 32 m	
0416 749 985	Control cable 36 m	
0416 749 986	Control cable 40 m	
0416 749 987	Control cable 2 m	
0416 749 988	Control cable 5 m	
0416 749 989	Control cable 9 m	



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ESAB AB, Lindholmsallén 9, Box 8004, 402 77 Gothenburg, Sweden, Phone +46 (0) 31 50 90 00

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