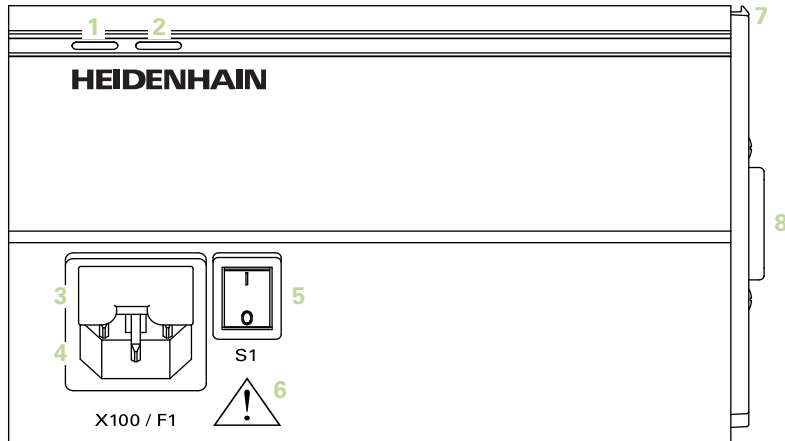# HEIDENHAIN

MSE 1000

Operating Instructions
for use with MSEsetup v2.1.x

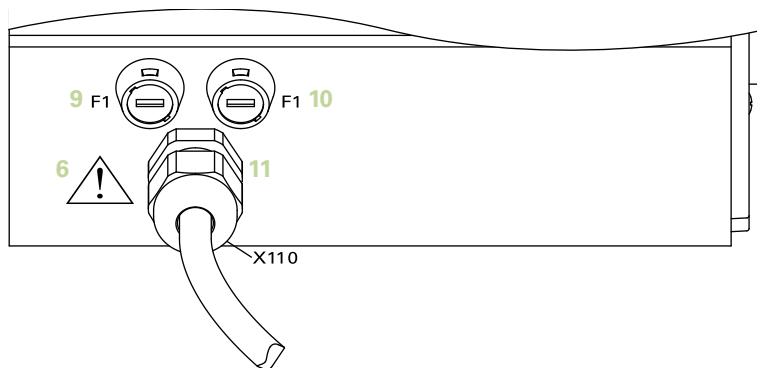# Product overview

Front MSE 1201
ID 747501-01
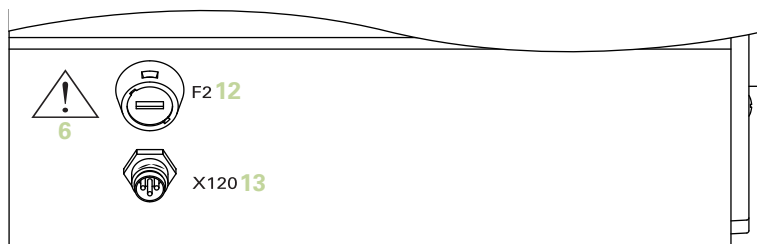

Front MSE 1201
ID 747501-02

Front MSE 1202
ID 747502-0x

Front MSE 1114
ID 747499-0x

14 — 15 — 16
X103   X116   X11   X13
                 X12   X14
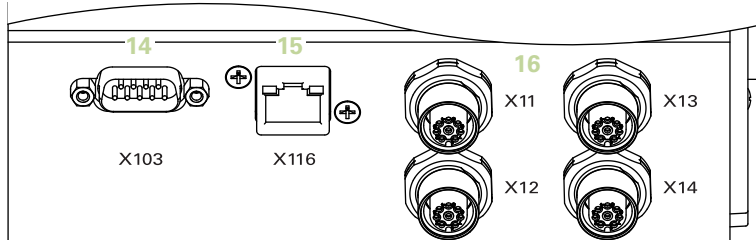
Front MSE 1314
ID 747503-0x

16
X11   X13
X12   X14
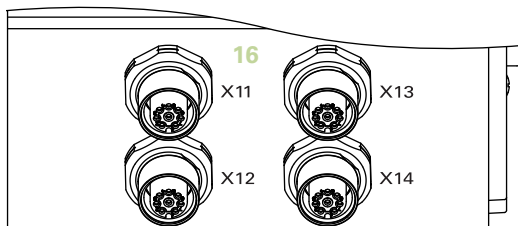
Front MSE 1318
ID 747504-0x

16
X11   X13   X15   X17
X12   X14   X16   X18
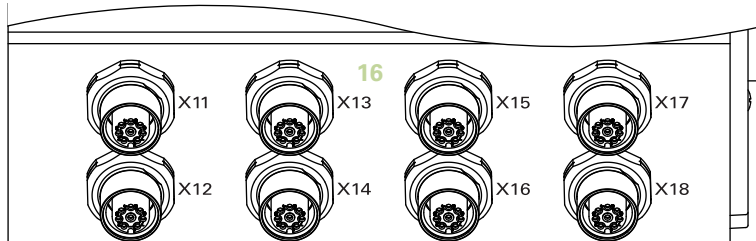
Front MSE 1124
ID 747511-0x

X103   X116   X21   X22   X23   X24
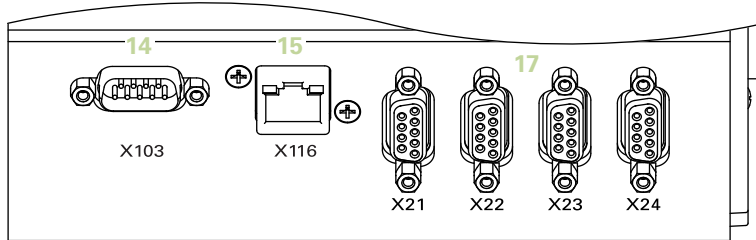
Front MSE 1324
ID 747512-0x

X21   X22   X23   X24
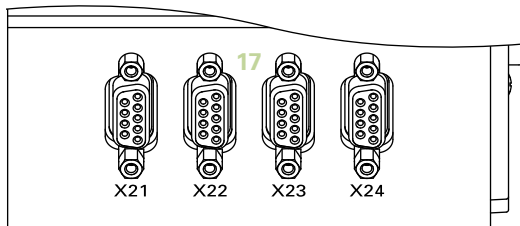
Front MSE 1328
ID 747513-0x

X21   X22   X23   X24   X25   X26   X27   X28
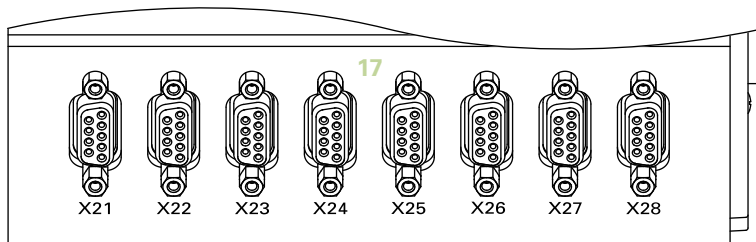
Front MSE 1184
ID 747500-0x

X103   X116

X1   X2   X3   X4
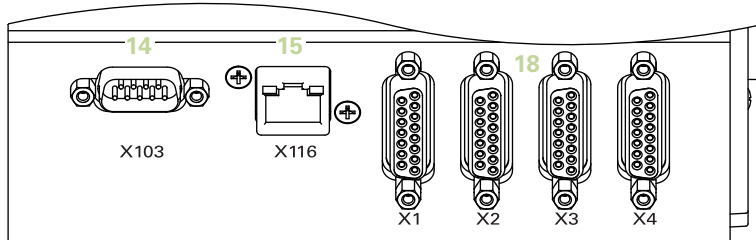
Front MSE 1384
ID 747505-0x

X1   X2   X3   X4
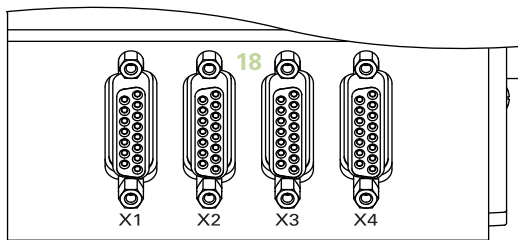
Front MSE 1388
ID 747506-0x

X1   X2   X3   X4   X5   X6   X7   X8
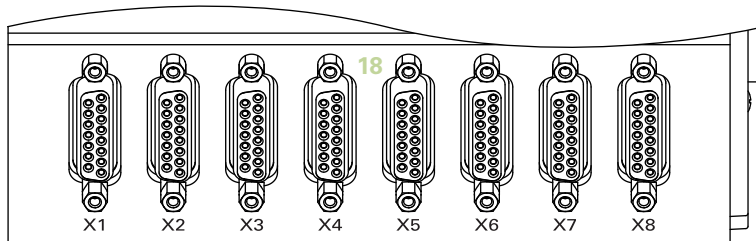
Front MSE 1332
ID 747509-0x
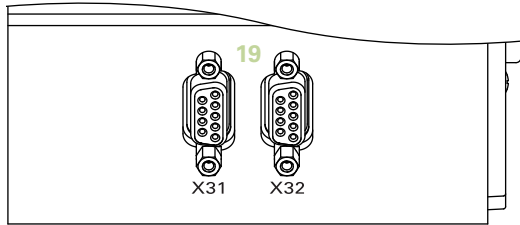
Front MSE 1358
ID 747514-0x
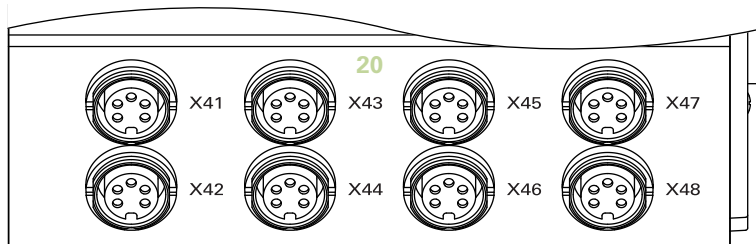
Front MSE 1401
ID 747507-01
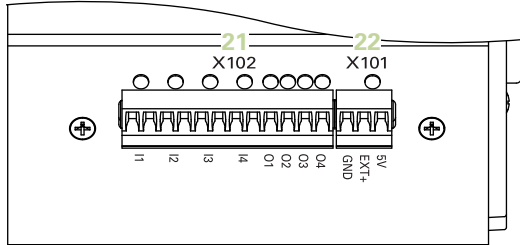
Front MSE 1401
ID 747507-02
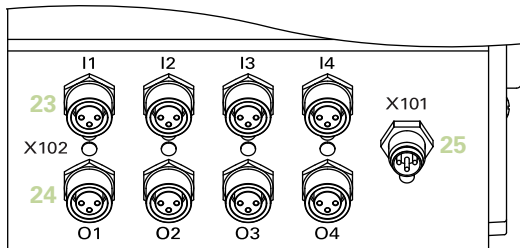
Front MSE 1501
ID 747508-0x
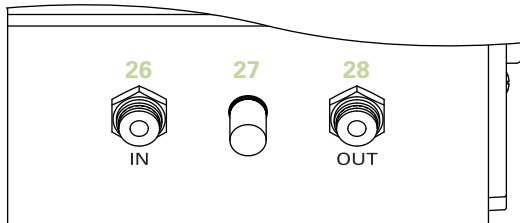
Top MSE 1201
ID 747501-0x
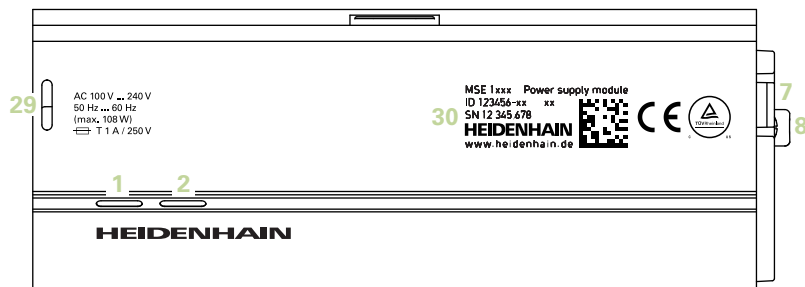
Top MSE 1202
ID 747502-0x
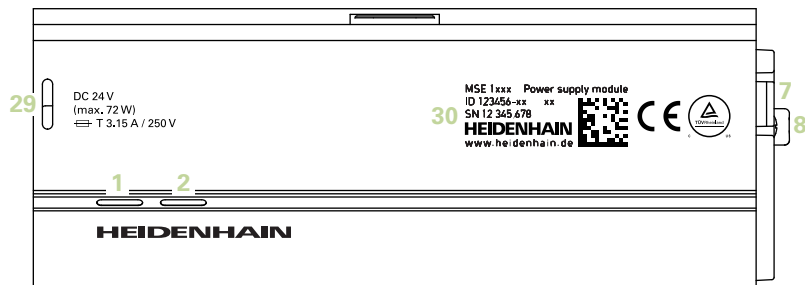
Top MSE 1114, MSE 1318, MSE 1184, MSE 1388
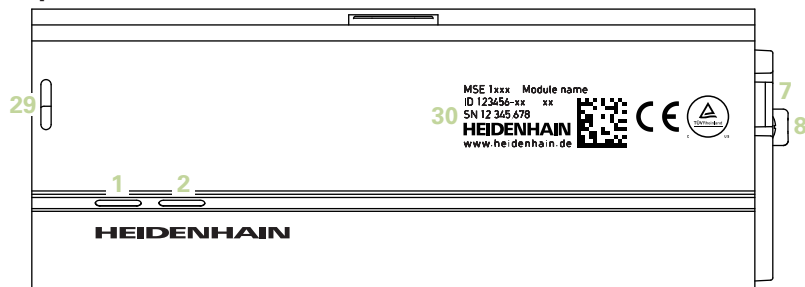
Top MSE 1314, MSE 1384, MSE 1401, MSE 1501
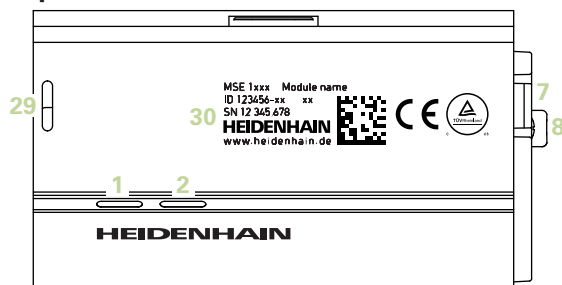
Rear MSE 1201, MSE 1202, MSE 1114, MSE 1318, MSE 1184, MSE 1388

Rear MSE 1314, MSE 1384, MSE 1401, MSE 1501

Product overview

Left side

Right side

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1 How to use these instructions

The instructions contained in this document provide the information necessary to install and operate this product.

These instructions are intended for use by personnel qualified to install, maintain and operate the **HEIDENHAIN MSE 1000**.

A **qualified person** is someone whose technical education, knowledge and experience, as well as knowledge of the relevant system of rules qualifies the person to evaluate the delegated task and recognize possible hazards.

1.1 Hazard warnings shown in these instructions

Hazard warnings warn you about dangers associated with operation of the device, and inform you of how to avoid them. They are classified according to the severity of the danger, and are divided into the following groups:

Warning types

⚠ **DANGER**

Describes an **imminent danger**.

If it is not avoided, **death** or **very serious injuries** will result.

⚠ **WARNING**

Describes a **possible impending danger**.

If it is not avoided, **death** or **very serious injuries** can result.

⚠ **CAUTION**

Describes a **possible impending danger**.

If it is not avoided, **slight or minor injuries** can result.

NOTICE

Describes a **possibly dangerous situation**.

If it is not avoided, **the device** or **something near it can be damaged**.

ℹ An informational box gives **important or additional information** about an activity or concept.

It also brings your attention to situations or circumstances that can lead to measuring errors or malfunctions.

1.2 Menu and screen images shown in these instructions

MSEsetup is a PC application designed to communicate with MSE 1000 modules. Menu and screen images often accompany text to clarify or emphasize product concepts. Screen images might reflect different MSEsetup configurations depending on the concepts presented. Menu and screen images might not reflect your MSEsetup configuration exactly. However, except where noted, the concepts are common to all MSEsetup configurations. Simply ignore menu functions and other user interface items that do not apply to your system.

1.3 Fonts used in these instructions

Operator controls–**Computer Keys**, computer screen **Windows**, **Menus**, **Toolbars**, and **Buttons**–included in instruction sequences are shown in **bold type**.

1.4 Software version

The MSESetup software version is listed in the About window.

MSE 1000

| MSEsetup version: | v2.0.0 |
| MSElibrary version: | v2.0.0 |

Copyright© HEIDENHAIN, 2013.
All rights reserved.
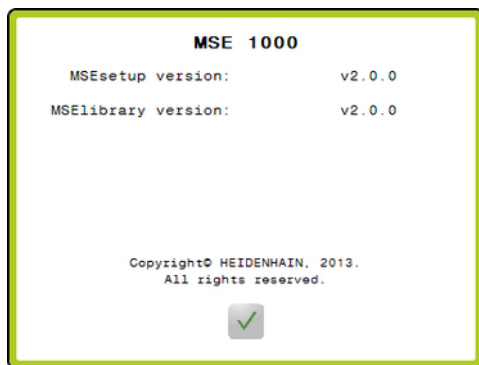
About window

About button

To open the About window:

▶ Click the **About** button located in the MSEsetup Title bar.

2 Model information

ID label

Index label

These instructions cover the following models:

Model	ID
MSE 1201	747501-01, 747501-02
MSE 1202	747502-01, 747502-02[1]
MSE 1114	747499-01, 747499-02[1]
MSE 1124	747511-01, 747511-02[1]
MSE 1184	747500-01, 747500-02[1]
MSE 1314	747503-01, 747503-02[1]
MSE 1318	747504-01, 747504-02[1]
MSE 1324	747512-01, 747512-02[1]
MSE 1328	747513-01, 747513-02[1]
MSE 1384	747505-01, 747505-02[1]
MSE 1388	747506-01, 747506-02[1]
MSE 1332	747509-01, 747509-02[1]
MSE 1358	747514-01, 747514-02, 747514-03, 747514-04[1], 747514-05[1], 747514-06[1]
MSE 1401	747507-01, 747507-02
MSE 1501	747508-01, 747508-02[1]

[1]Requires MSEsetup v2.1.0 or newer.

> **ℹ** Verify that these instructions are valid by matching the Index on the label **34** with the Index listed at **www.heidenhain.de**. If these instructions are not valid, download the applicable Instructions from **www.heidenhain.de**.
>
> An index may not be present on all products.

3   Safety

The following messages provide safety information for preventing personal injury and product damage:

> ⚠ **WARNING**
>
> Read and understand these instructions before use to avoid the possibility of personal injury or death.

> ⚠ **WARNING**
>
> Hazardous live parts may be exposed if the unit is opened.
>
> Do not open the unit. There are no serviceable items inside.

> ⚠ **WARNING**
>
> The protection provided by the equipment may be impaired if used in a manner not specified.
>
> Do not use this product in any way other than its intended use.

> ℹ For safety, operation and handling of the unit, keep this document for future reference.
>
> This document must be kept within reaching distance of the product.

3.1   Safety symbols

Where the following safety symbols appear on the product they alert you to important safety information.

	Symbol	Description
6	⚠	Refer to the accompanying information or documentation to protect against personal injury or damage to the unit.
5			Power switch "On (supply)" position.
5	○	Power switch "Off (supply)" position.

4 Mounting

The following items are included with the product:
- MSE 1xxx module
- Installation Instructions
- Cable mounting hardware kit
- Power connector, included with MSE 1201 (ID 747501-0x)
- Left end cover kit, included with MSE 1201 (ID 747501-0x) and MSE 1202 (ID 747502-0x)
- Right end cover kit, included with MSE 1201 (ID 747501-0x) and MSE 1202 (ID 747502-0x)
- Female M8 connector, included with MSE 1202 (ID 747502-0x) and MSE1401 (ID 747507-02)
- Male M8 connector, included with MSE 1401 (ID 747507-02): Qty. 2

⚠ WARNING

Do not mount in a position that makes it difficult to access the power switch or power cable.

MSE 1000 modules are designed to be mounted on a standard 35 mm, DIN EN 50022 rail in an electrical cabinet or on a mounting stand (accessory). The individual modules are plugged into each other and fixed together with a lock creating a module chain.
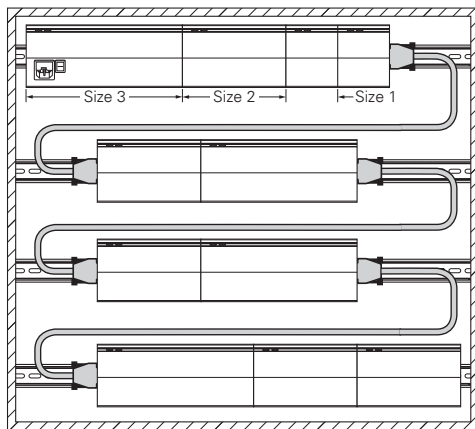
19" mounting cabinet
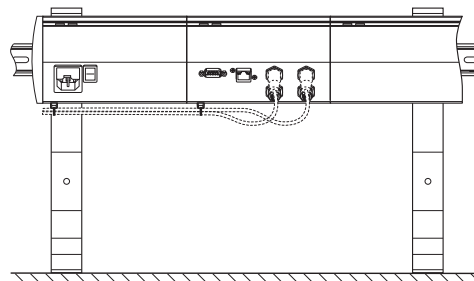
Mounting stand

In its basic configuration, the MSE 1000 consists of a power supply module and a base module. It can be expanded by further modules as needed. In all, up to 250 axes or channels can be configured.

Multiple power supply modules may be needed based on the power consumption of the modules following the power supply in the module chain and any equipment connected to those modules. When the maximum power rating of a power supply module is reached it is necessary to install another power supply module into the module chain. For maximum power consumption rating of power supply modules see "Technical specifications", page 167.

Power consumption calculation example

The power supply module (MSE 1201, MSE 1202) provides the electrical power for further modules and encoders. If the power provided does not suffice to operate the desired system configuration, a further power supply module must be used.

The power consumption is specified for each module (see table). The power consumption of the connected HEIDENHAIN encoders can be calculated from the catalog data (supply voltage x current consumption). For all other consumers (e.g. inductive and analog sensors), the connected load must be known. The sum power of all consumers must not exceed the rated power of the power supply module(s).

The following example illustrates this calculation.

Components to be supplied

Encoders:	8 x ACANTO AT 1217, 12 x SPECTO ST 1288, 2 x LS 388 C, 2 x temperature sensors 20 V/100 mA
Modules:	1 x MSE 1114 basic module, 1 x MSE 1314 axis module, 2 x MSE 1388 axis modules, 1 x MSE 1501 compressed-air module, 1 MSE 1332 analog module

Power calculation

	Data from catalog and calculated				Total power consumption (example)
	Operating voltage	Current consumption	Power consumption/ unit	Number of units	
ACANTO AT 1217	5 V	150 mA	0.75 W	8	6 W
SPECTO ST 1288	5 V	90 mA	0.45 W	12	5.4 W
LS 388 C	5 V	100 mA	0.5 W	2	1 W
Thermistor	20 V	100 mA	2 W	2	4 W
MSE 1114	–	–	3.5 W	1	3.5 W
MSE 1314	–	–	3.3 W	1	3.3 W
MSE 1388	–	–	5 W	2	10 W
MSE 1501	–	–	3.7 W	1	3.7 W
MSE 1332	–	–	3.2 W	1	3.2 W
Total:					40.1 W

This power consumption can be met by one MSE 1201 (50 W) or MSE 1202 (70 W) power supply module.

4.1 Mounting a module

⚠️ **CAUTION**

A power supply module must always be to the left of any modules it is powering in the module chain. Once the maximum power consumption rating of a power supply module is reached, install another power supply module into the module chain.
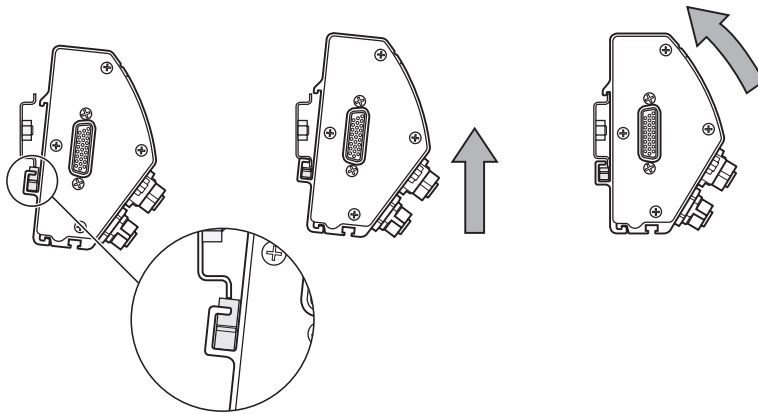
To mount a module:

▶ Verify all power switches are in the off position (if applicable) and power is removed from all power supply modules in the module chain.

▶ Align the bottom edge of the DIN rail with the bottom channel **33** of the module.

▶ Gently apply upward pressure, depressing the DIN rail spring **32** and inserting the DIN rail into the bottom channel **33** of the module.

▶ While maintaining upward pressure, rotate the top of the module towards the DIN rail until the top channel **31** of the module is aligned above the DIN rail.

▶ Gently release the upward pressure, locking the module onto the DIN rail.

4.2   Connecting modules
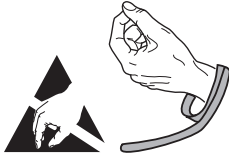
> ⚠ **CAUTION**
>
> This product contains components that can be damaged by electrostatic discharge (ESD). Observe precautions for handling ESD sensitive devices and never touch connector pins unless properly grounded.
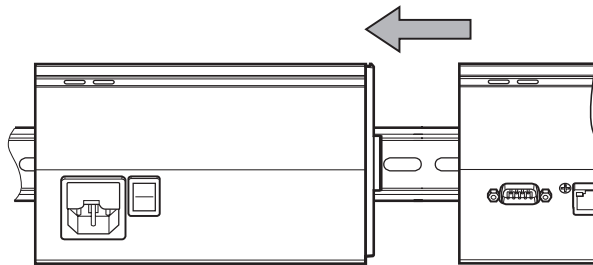
To connect modules:

▶ Verify all power switches are in the off position (if applicable) and power is removed from all power supply modules in the module chain.

▶ Slide the right module to the left until the lock tab **7** of the left module engages with the lock tab receiver **29** of the right module.

4.3 Installing end covers
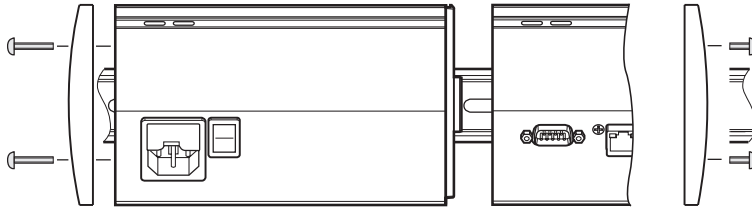
Left and right end cover kits are provided with each power supply module for covering open module ends.

To install end covers:

▶ Insert the left end cover into the left side of the first power supply module in the chain.

▶ Insert 19 mm end cover screws through the end cover mounting holes and into the end cover screw holes **34** on the module.

▶ Using a cross-head screwdriver, tighten the screws.

▶ Install the right end cover onto the right side of the last module in the chain using the provided 9 mm screws and following the instructions given above.

4.4 Installing cable mounting hardware
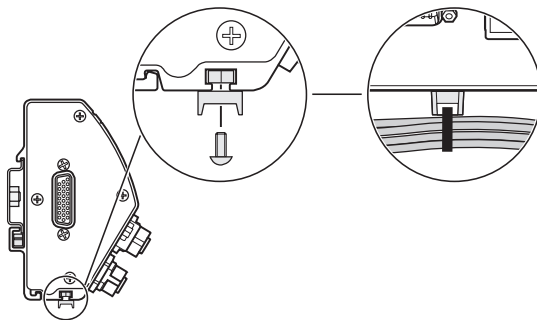
A cable mounting hardware kit is provided with each module for routing cables. Each kit contains two sets of mounting hardware.

To install cable mounting hardware:

▶ Insert the M3 hex nut into the cable mounting slot **36** on the bottom of the module.

▶ Insert the M3 screw through the cable tie holder and fasten to the M3 hex nut using a cross-head screwdriver.

▶ Insert the cable tie through the cable tie holder and fasten cables.

4.5   Releasing a module
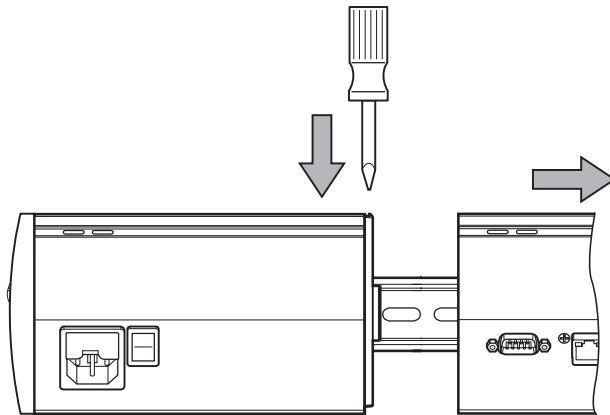
To release a module:

▶ Verify all power switches are in the off position (if applicable) and power is removed from all power supply modules in the module chain.

▶ Press a flat-edge screwdriver into the lock tab receiver **29** opening at the top left of the right hand module and press down on the lock tab **7** of the left hand module to release the module.

▶ Gently apply upward pressure, depressing the DIN rail spring **32**.

▶ While maintaining upward pressure, rotate the top of the module away from the DIN rail.

▶ Gently release the upward pressure, releasing the module from the DIN rail.

5 Installation

> ⚠ **WARNING**
>
> The safety of any system incorporating the use of this product is the responsibility of the assembler or installer of the system.

> *NOTICE*
>
> Do not engage, or disengage any connections while the unit is under power. Damage to internal components may result.

Interfaces

1	Power indicator LED.
2	Network bus indicator LED.
3, 9, 10	**F1:** Replaceable fuse holder.
4	**X100:** Power connector.
5	**S1:** Power switch.
8, 35	Module connectors.
11	**X110:** Power connector.
12	**F2:** Replaceable fuse holder.
13	**X120:** Power connector.
14	**X103:** Foot switch connection.
15	**X116:** RJ-45 for network connection.

Interfaces

16	Encoder inputs: X11 ... X18 axis for EnDat interface encoders. The number of axes varies by module.
17	Encoder inputs: X21 ... X28 axis for TTL interface encoders. The number of axes varies by module.
18	Encoder inputs: X1 ... X8 axis for 1 V_{PP} interface encoders. The number of axes varies by module.
19	9-pin D-sub: X31, X32 for analog input.
20	Transducer inputs: X41 ... X48 axis for LVDT and half-bridge transducers.
21	Terminal block: X102 for I/O.
22	Terminal block: X101 for I/O power.
23	3-pin M8: X102 I1, I2, I3, I4 for switching input.
24	3-pin M8: X102 O1, O2, O3, O4 for relay output.
25	3-pin M8: X101 for I/O power.
26	Plug-in connection for compressed air input.
27	Muffler for pressure relief.
28	Plug-in connection for compressed air output.

5.1 Electrical connection

⚠ WARNING
A risk of electrical shock exists if this product is not properly grounded.
To avoid the hazard, always use a 3-conductor (grounded) power cord and ensure the ground is properly wired to the building installation.

⚠ WARNING
A risk of fire exists if a power cord not meeting minimum specifications is used.
To avoid the hazard, always use power cords that meet or exceed the minimum listed specifications.

5.1.1 Power cord
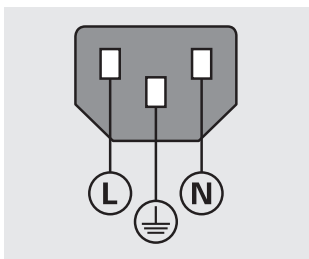
MSE 1201
(ID 747501-01)
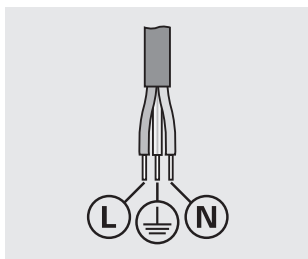
MSE 1201
(ID 747501-02)
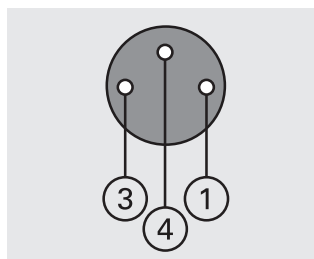
MSE 1202
(ID 747502-0x)

MSE 1201		MSE 1202		
L:	Line voltage (brown)	**1**		DC 24 V
N:	Neutral (blue)	**3**		0 V
⏚	Protective conductor (ground) terminal(green/yellow)	**4**	⏚	Protective conductor (ground) terminal
3-conductor (grounded)		Min. wire cross section: 0.24 mm^2		
Min. cable cross section: 0.75 mm^2		Max. wire cross section: 0.35 mm^2		
Max. cable length: 3 m				

5.1.2   Wiring the power connector

MSE 1201 (ID 747501-01)
MSE 1201 (ID 747501-01) includes a power connector that needs to be wired to a suitable power cord.
Further Information: "Power cord", page 40.
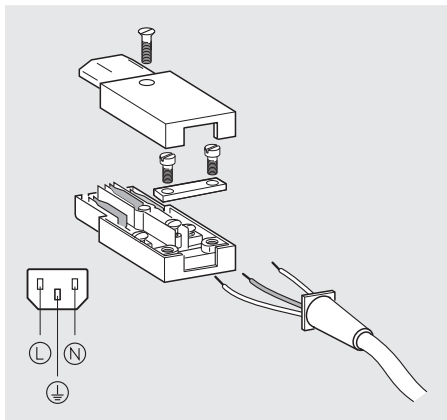
To wire the power connector MSE 1201 (ID 747501-01):
▶ Verify that the power cord is not plugged into the main power supply.
▶ Wire the power connector according to the illustration above.

MSE 1202 (ID 747502-0x)
MSE 1202 (ID 747502-0x) includes a female M8 connector (ID 1071955-01) that needs to be wired to a suitable power cord.
Further Information: "Power cord", page 40.

Replacement connectors can be purchased from HEIDENHAIN.
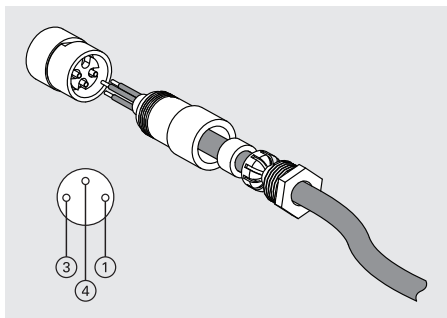
To wire the power connector MSE 1202 (ID 747502-0x):
▶ Verify that the power cord is not plugged into the main power supply.
▶ Wire the power connector according to the illustration above.

5.1.3 Connecting a power cord

MSE 1201 (ID 747501-01)
To connect the MSE 1201 (ID 747501-01) power cord:
▶ Verify that the power switch is in the off position.
▶ Verify that the power cord is not plugged into the main power supply.
▶ Insert the female end of the power cord into the power connector **4** on the front of the module.

MSE 1201 (ID 747501-02)
To connect the MSE 1201 (ID 747501-02) power cord:
▶ Verify that there is no power at the source.
▶ Wire the power cable to the source.

MSE 1202 (ID 747502-0x)
To connect the MSE 1202 (ID 747502-0x) power cord:
▶ Verify that the power cord is not plugged into the main power supply.
▶ Align the cable connector with the module connector.
▶ Insert the power cord connector into the power connector **13** on the front of the module.
▶ Hand tighten the M8 connector onto the module.

5.2 Data interface connections

5.2.1 Connecting a foot switch

14
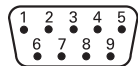
Foot switch connector

This product can be used with HEIDENHAIN foot switch (ID 681041-03).
To connect a foot switch:
▶ Verify power is removed from all power supply modules in the module chain.
▶ Connect the foot switch cable connector to the foot switch connection **14** on the module and tighten the cable connector screws until they are snug.

5.2.2   Connecting a network cable

15
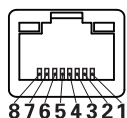
RJ-45 connector

MSE modules communicate with a PC workstation through an RJ-45 connection **15** located on the base module. Use a straight-through cable when connecting to a DHCP router. A crossover cable may be required when connecting the workstation directly to the base module. Refer to the documentation provided with the NIC for additional information.

To connect a network cable:

▶ Verify power is removed from all power supply modules in the module chain.

▶ With the cable connector locking tab facing up, insert the cable connector into the RJ-45 connection **15** on the module until the tab locks into place.

5.2.3   Connecting an EnDat encoder

16
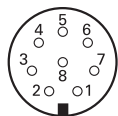
EnDat encoder connector

This product can be used with HEIDENHAIN length gauges, linear encoders and rotary encoders that provide EnDat signals. The connecting cable must not exceed 100 meters in length.

To connect an EnDat encoder:

▶ Verify power is removed from all power supply modules in the module chain.

▶ Align the encoder cable connector notch with the module encoder connection notch.

▶ Insert the cable connector into the encoder connection **16** and tighten the cable connector by turning clockwise until it is snug.

5.2.4   Connecting a TTL encoder

17
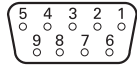
TTL encoder connector

This product can be used with HEIDENHAIN encoders that provide TTL signals. The connecting cable must not exceed 30 meters in length.

To connect a TTL encoder:

▶ Verify power is removed from all power supply modules in the module chain.
▶ Connect the encoder cable connector to the encoder connection **17** on the module and tighten the cable connector screws until they are snug

5.2.5   Connecting a 1 V$_{PP}$ encoder

18
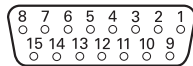
1 V$_{PP}$ encoder connector

This product can be used with HEIDENHAIN linear and rotary encoders that provide 1 V$_{PP}$ signals. The connecting cable must not exceed 30 meters in length.

To connect a 1 V$_{PP}$ encoder:

▶ Verify power is removed from all power supply modules in the module chain.
▶ Connect the encoder cable connector to the encoder connection **18** on the module and tighten the cable connector screws until they are snug.

5.2.6   Connecting a 9-pin D-sub connector

19
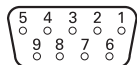
9-pin D-sub connector

This product provides a 9-pin D-sub connector for input of analog signals. The connecting cable must not exceed 30 meters in length.

To connect a 9-pin D-sub connector:

▶ Verify power is removed from all power supply modules in the module chain.
▶ Connect the cable connector to the 9-pin D-sub connection **19** on the module and tighten the cable connector screws until they are snug

5.2.7   Connecting a transducer

20
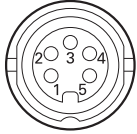
Transducer connector

This product can be used with select Solartron, Tesa, Marposs and Mahr half-bridge and LVDT transducers. Refer to the transducer documentation for maximum connecting cable length.

To connect a transducer:

▶ Verify power is removed from all power supply modules in the module chain.

▶ Align the transducer cable connector notch with the module transducer connection notch

▶ Insert the cable connector into the transducer connection **20** and tighten the cable connector by turning clockwise until it is snug

5.2.8   Connecting an I/O terminal block connector

21
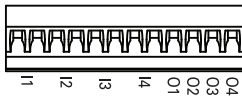
I/O terminal block connector

The MSE 1401 (ID 747507-01) provides a terminal block I/O connection for switching inputs and relay outputs. The switching inputs are active when a High signal (contact or pulse) is present. They are isolated and can be supplied externally or internally.

Further Information: "Relay outputs", page 179.
Further Information: "Switching inputs", page 179.

To connect the terminal block:

▶ Verify that power is off or disconnected.

▶ Remove the male terminal connector from the module connection.

▶ Insert the required + and - wires for switching inputs or the required output wire for relay outputs into their respective terminals on the male terminal connector.

▶ Using a small flat-edge screwdriver, tighten the screws located on the top of the cable connector.

▶ Insert the male terminal connector into the connection on the module.

5.2.9 Connecting an I/O terminal block power connector

22

I/O terminal block power connector

The MSE 1401 (ID 747507-01) provides a terminal block connection for 5 V power output, external power input and GND for use with relay outputs.
Further Information: "Connecting an I/O terminal block connector", page 45
Further Information: "Relay outputs", page 179.
To connect the terminal block power connector:
▶ Verify that power is off or disconnected.
▶ Remove the male terminal connector from the module connection.
▶ Insert the required 5 V, Ext+ and GND wires into their respective terminals on the male terminal connector based on power requirements.
▶ Using a small flat-edge screwdriver, tighten the screws located on the top of the connector.
▶ Insert the male terminal connector into the connection on the module.

5.2.10 Wiring an M8 connector

The MSE 1401 (ID 747507-0x) includes two M8 male connectors (ID 1071953-01) for switching inputs and relay outputs. A female M8 connector (ID 1071955-01) is included for 5 V power output, external power input and GND for use with relay outputs. Additional connectors can be purchased from HEIDENHAIN. Wire the power connector based on power requirements. M8 connectors need to be wired to a suitable cable.
Further Information: "Connector pin assignments", page 176
Further Information: "Switching inputs", page 179
Further Information: "Relay outputs", page 179.
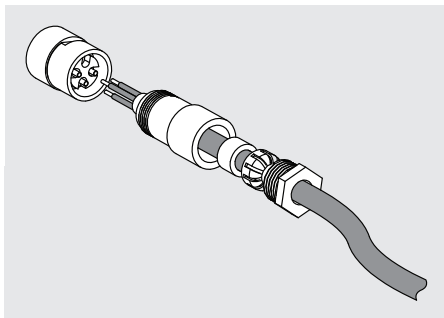
To wire an M8 connector:
▶ Verify that power is off or disconnected.
▶ Wire the connector according to the illustration shown above.

5.2.11 Connecting a cable with an M8 connector

23, 24 **25**

M8 connectors

Covers are provided for I/O connections. Leave the cover on unused connections.

To connect a cable with an M8 connector:
▶ Verify that power is off or disconnected.
▶ Remove the connector cover by turning counterclockwise using a flat-edge screw driver.
▶ Align the cable connector with the module connector.
▶ Insert the cable connector into the connector on the front of the module.
▶ Hand tighten the M8 cable connector onto the module.

5.2.12 Connecting and disconnecting a compressed air tube

26, 28

Compressed air connector

The MSE 1501 provides 4 mm tube connections for compressed air input and output.

To connect a compressed air tube:
▶ Verify that power is off or disconnected.
▶ Insert the 4 mm tube into the connector on the front of the module.

To disconnect a compressed air tube:
▶ Verify that power is off or disconnected.
▶ Push in on the blue connector ring and remove the 4 mm tube.

6 Initial power-up

MSE 1201 (ID 747501-01)

The MSE 1201 (ID 747501-01) power supply module has a power switch **5** for turning power on and off.

To power-up the system:

▶ Press the On (supply) side of the power switch to power-up the system.

MSE 1201 (ID 747501-02), MSE 1202 (ID 747502-0x)
The MSE 1201 (ID 747501-02) and MSE 1202 (ID 747502-0x) power supply modules do not have a power switch for turning power on and off.

To power-up the system:

▶ Turn power on for the system.

6.1 Power cycling

Power cycling refers to the procedure of turning the power provided to the MSE 1000 modules off and then back on. Power cycling is typically used when troubleshooting communication problems between MSEsetup and the modules and may allow the modules to reinitialize their configuration or recover from an unresponsive state.

To power cycle the module chain:

▶ Power-off the module chain. Refer to "Power-off", page 165.
▶ Wait twenty seconds.
▶ Power-up the module chain. Refer to "Initial power-up", page 48.

7   Software setup

7.1   Installing MSEsetup

MSEsetup installer icon

To install MSEsetup:
▶ Download the MSEsetup software from **www.heidenhain.de**.
▶ Double click the MSEsetup installer icon.
▶ Select the language for the installation.
▶ Click **OK**.
The MSEsetup installation wizard is opened.
▶ Click **Next >**.
▶ Select **I accept the terms in the license agreement** and click **Next >**.
▶ Click **Next >** to select the default folder location. The installation location can be changed by clicking **Change...** and selecting another folder.
▶ Select the desired Setup Type and click **Next >**. If Custom is selected, follow the on-screen instructions to customize the MSEsetup installation.
▶ Click **Install**.
MSEsetup is installed and the Installation Wizard Completed screen is displayed.
▶ Click **Finish**.

File locations
Configurable data, log files, and data capture files are stored in the following public locations:
■ **Windows XP:** C:\Documents and Settings\All Users\HEIDENHAIN\MSEsetup
■ **Windows Vista:** C:\Users\Public\HEIDENHAIN\MSEsetup
■ **Windows 7:** C:\Users\Public\HEIDENHAIN\MSEsetup

Program group

MSEsetup shortcuts are installed in a program group located in the Windows Start menu. These shortcuts can be used to open MSEsetup, MSE 1000 Operating Instructions, the Excel VBA Example, and to Uninstall MSEsetup.

To access MSEsetup program group shortcuts:

▶ Click the Windows Start menu icon in the taskbar.

▶ Navigate to **All Programs / HEIDENHAIN / MSEsetup**.

Desktop shortcut

Desktop shortcut

A shortcut to MSEsetup is installed on the desktop. This shortcut can be used to open MSEsetup without having to navigate to the program group located in the Windows Start menu.

To open MSEsetup from the desktop:

▶ Double click the MSEsetup desktop shortcut.

7.2 MSEsetup overview

MSEsetup is a PC application designed to communicate with MSE 1000 modules. For minimum and recommended workstation PC requirements, see "Workstation requirements", page 173.

MSEsetup functions include:

- MSE 1000 module, channel and device configuration
- Network communication configuration
- Capturing data
- Module and device diagnostics information
- Warning and error notifications
- Logging of MSE 1000 system activity

7.2.1   Operating elements

Setup and operation of MSE 1000 modules is performed from a workstation PC running the MSEsetup application software.

Further Information: "MSEsetup overview", page 50.

Operation and navigation in MSEsetup is accomplished through the operating elements described in the following tables.

Title bar buttons

Button	Function
?	**About:** Displays the software version and HEIDENHAIN company information.
—	**Minimize:** Minimizes the MSEsetup window into the task bar.
▢	**Maximize:** Maximizes the MSEsetup window to fill the full screen.
▢	**Restore:** Restores the MSEsetup window from full screen to normal. The MSEsetup window can be moved around the screen when it is restored.
X	**Close:** Closes MSEsetup.

7.2 MSEsetup overview

Navigation bar buttons

Button	Function
	Logging: Opens to the Logging screen.
	Setup: Opens the Module, Channel and Device settings screen.
	Data: Opens the Data Capture screen.
	Master: Opens the Mastering screen.
	Diagnostics: Opens the Diagnostics screen.
	Config: Opens the System Configuration screen.
	Connect: Opens the Network Configuration screen.
	Back: Returns to the previously viewed screen.

Help button

Button	Function
?	**Help:** Opens the MSEsetup Help file.

File management buttons

Button	Function
	Open: Opens the file dialog window to select a file to open.
	Save: Saves the current data back to the file and folder it originally came from.
	Save as: Opens the file dialog window to create a copy of the file in a different folder or make a copy with a different name.
	Print: Sends the current data to a printer.

File dialog buttons

Button	Function
	System directory: Provides quick access to the system folder.
	User directory: Provides quick access to the user folder.
	Parent directory: Navigates from the current folder location to its parent folder.

Confirmation buttons

Button	Function
	OK: Confirms or starts an action.
	Cancel or Delete: Deletes data or cancels an action.

Enable/disable buttons

Button	Function
	Enabled: Shows that an option is enabled. Clicking the button will toggle the option to disabled.
	Disabled: Shows that an option is disabled. Clicking the button will toggle the option to enabled.

Setup screen buttons

Button	Function
	Calibration screen: Opens the calibration screen for calibrating LVDT modules. Clicking will toggle the button to the Setup screen button.
	Setup screen: Returns to the setup screen from the LVDT calibration screen. Clicking will toggle the button to the Calibration screen button.

LVDT teach resolution screen buttons

Button	Function
	SetAllMin: Sets the minimum position value for all sensors. Minimum position values are used when calculating sensor resolution.
	SetAllMax: Sets the maximum position value for all sensors. Maximum position values are used when calculating sensor resolution.

Data screen buttons

Button	Function
	Excel: Opens the Microsoft Excel file for data capture.
	Delete all: Deletes all data in the Data screen and Microsoft Excel file.
	Reset: Resets the min and max data for all channels.

Mastering screen buttons

Button	Function
	Enable channel: Turns on mastering for an individual channel. This setting is remembered when MSEsetup is restarted.
	Disable channel: Turns off mastering for an individual channel. This setting is remembered when MSEsetup is restarted.
	Apply all: Applies a master offset based on the desired master position for each channel.
	Unapply all: Unapplies mastering for all channels. This feature does not disable the channels individually but instead does not apply offsets to the actual position values. Available only when supervisor mode is enabled.

Diagnostics screen buttons

Button	Function
	Function reserves: Opens Function Reserves information for EnDat devices.
	Warning/Error: Opens the Warnings and Errors screen.

Error screen buttons

Button	Function
	Delete all errors: Clears all warnings and errors.
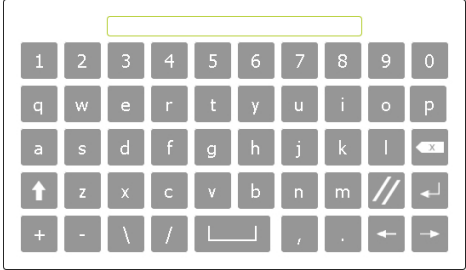
Tree view buttons

Button	Function
	Collapse: Hides the Tree view to allow more on-screen room for data viewing.
	Expand: Displays the Tree view when hidden.

Text screen navigation buttons

Button	Function
	Up arrow: Scrolls up one line at a time.
	Down arrow: Scrolls down one line at a time.
	Page up: Scrolls up one screen length.
	Page down: Scrolls down one screen length.

Keypads

Keypad	Function
	Virtual keypad: Allows touch screens to have text entry capabilities.
	Numeric keypad: Allows touch screens to have number entry capabilities.

7.2.2 The application window

The MSEsetup application window is divided into four primary areas:

MSEsetup application window

Application window		
A	**Title bar**	Location of the application window control buttons.
B	**Content area**	A dynamic area where operation and setup screens are displayed.
C	**Message area**	Displays warnings and errors and messages related to the current operation.
D	**Navigation bar**	Location of the MSEsetup navigation buttons.

7.2.3   Views
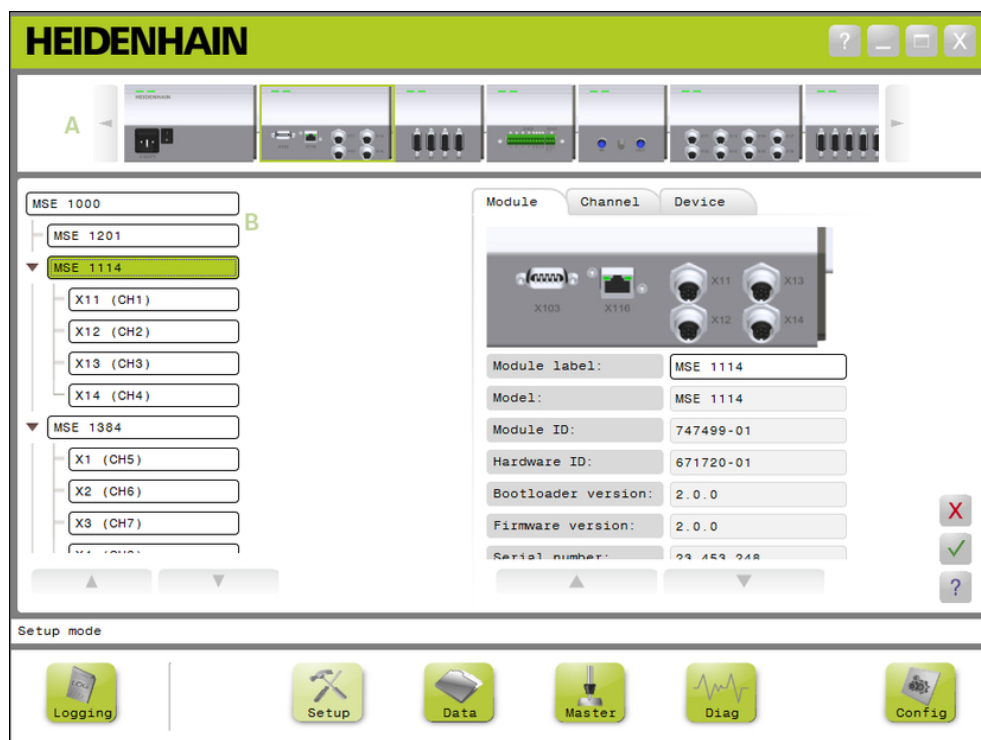
Module view and tree view in the application window

Views

A	Module view
B	Tree view

Module view

The Module view **A** is a graphical representation of the module chain that is displayed at the top of the content area when the Setup or Diagnostics screen is active.

Clicking on the image of a module will open the Module tab of the current screen. The tree will highlight the selected module.

Left and right arrows appear if there are more modules in the chain than can be displayed on the screen at one time. Click on these arrows to navigate through the module chain.

Tree view

The Tree view **B** is displayed on the left side of the content area when the Setup, Data, Master, or Diagnostics screen is active.

The tree displays the MSE 1000 module chain to the Channel level. Modules are nodes of the main tree. Channels are nodes of their respective module. The Data and Master screens add additional data to the right of the channels.

Clicking on a module name will open the Module tab of the current screen. Clicking on a channel name will open the Channel tab of the current screen.

Up and Down Arrows are used to navigate through the tree. Click on these arrows to navigate through the tree.

Module or channel text color will be yellow when a warning occurs or red when an error occurs.

7.2.4 File dialog window

The File dialog window is used when opening or saving a file. The File dialog window controls provide shortcuts and directory navigation tools for selecting where a file will be loaded from or saved to.
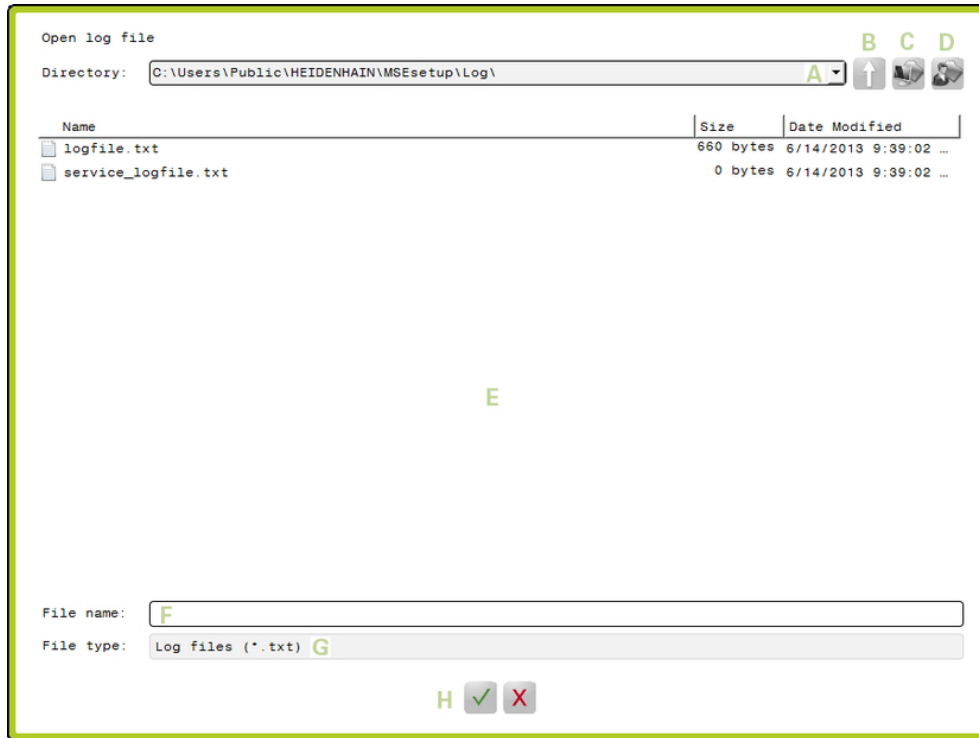
File dialog window

File dialog window controls

A	**Directory drop down list**	Displays the current folder location. The list contains the last 10 folders used. The most recently selected folder is placed at the end of the list.
B	**Parent directory button**	Navigates from the current folder to its parent folder.
C	**System directory button**	Navigates to the system folder.
D	**User directory button**	Navigates to the user folder.
E	**Current directory contents**	Double clicking on a folder name will navigate to the folder. Clicking on a file name will select the file.
F	**File name field**	Field used to enter a file name.
G	**File type field**	Displays the required file type.
H	**Confirmation buttons**	Used to confirm or cancel an action.

7.3   Basic functions

Opening MSEsetup

MSEsetup desktop shortcut

To open MSEsetup:

▶ Double click the MSEsetup desktop shortcut.

The startup splash screen will be displayed and MSEsetup will attempt to connect to MSE 1000 modules.

Minimizing the application window

Minimize button

To minimize the MSEsetup window:

▶ Click the **Minimize** button to minimize the MSEsetup application window to the taskbar.

Maximizing the application window

Maximize button

The MSEsetup application window will fill the full screen width when maximized.

To maximize the MSEsetup window:

▶ Click the **Maximize** button to maximize the MSEsetup application window.

Restoring the application window

Restore button

The MSEsetup application window is restored from full screen to normal mode.
The application window can be moved around the screen when in normal mode.

To restore the MSEsetup window:

▶ Click the **Restore** button to restore the MSEsetup application window to normal mode.

Closing the application window

Close button

To close MSEsetup:

▶ Click the **Close** button to close the MSEsetup application window. An opportunity to save the current log file will be given when closing the program.

Opening MSEsetup help

Help button

Each MSEsetup screen has a **Help** button that can be used to open the MSEsetup Operating Instructions.

To open the MSEsetup Operating Instructions:

▶ Click the **Help** button.

7.4   MSEsetup configuration

7.4.1   Configuration screen

Settings must be configured prior to using MSEsetup for the first time and any time operational or hardware changes occur. Day to day use does not require reconfiguration of settings. Settings are configured using buttons and menus in the Configuration screen.

MSEsetup settings:

- Language selection
- Data capture
- Supervisor mode
- Temperature units

- Virtual keypad
- Units of measurement
- Diagnostics mode
- Display formats

- Enable/disable prompts
- File options
- Update firmware
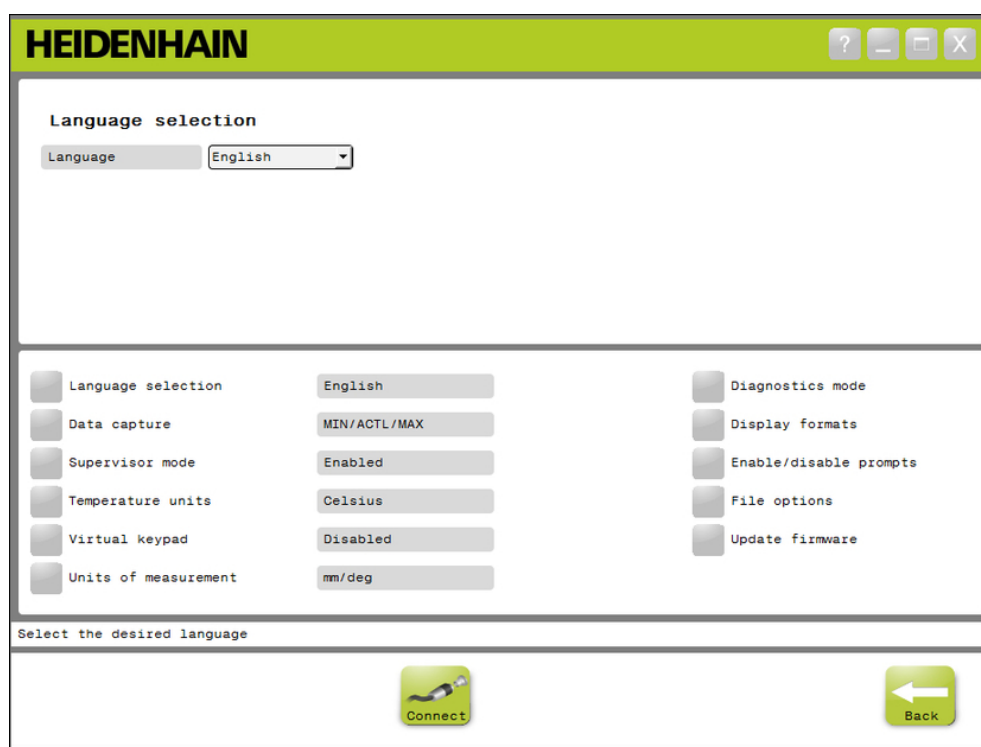
Configuration Screen

Config button

To open the Configuration screen:
▶ Click the **Config** button located in the Navigation bar.

7.4.2 Language selection

Language selection is used for changing the language of text displayed in MSEsetup and included in transmitted or printed data.

Available languages:

- German
- English
- French
- Italian
- Spanish

- Dutch
- Japanese
- Portuguese
- Russian
- Simplified Chinese

- Traditional Chinese
- Thai
- Korean
- Turkish

To select a language:

▶ Click the **Language selection** button.

Language options are displayed at the top of the screen.

▶ Click the **Language** drop down arrow and select a language.

The updated setting is displayed in the Language selection text box. A pop-up is displayed verifying the language has changed and notifying that MSEsetup will restart.

▶ Click the **OK** button.

MSEsetup will restart. Text is now displayed in selected language.

7.4.3   Data capture

Data capture settings are used to select the measurement values that will be be captured and displayed in the Data screen and the output file.

Data can be sent to the Data screen and the output file or to the output file only. Data capture speeds are increased by sending data to the output file only.

Data can be output to a Microsoft Excel file (Mse1000Data.xlsx) or to a Comma Separated Value file (Mse1000Data.csv).

Data capture options:

- Min
- Actual
- Max
- Spreadsheet only
- Output file type

Enable/disable data values

To enable or disable the capture of Minimum, Actual and Maximum data values:

▶ Click the **Data capture** button.

Data capture options are displayed at the top of the screen.

▶ Click the **Enabled/Disabled** button next to a measurement value to toggle between enabled and disabled.

Enable/disable data capture to the output file only

To enable or disable the capture of data values to the output file only:

▶ Click the button next to **Spreadsheet only** to toggle between enabled and disabled.

Select output file type

To select the output file type:

▶ Click the **Output File Type** drop down arrow and select a file type.

The updated setting is displayed in the Output File Type text box. A message verifying the action is displayed in the message area.

7.4.4 Supervisor mode

Enabling Supervisor mode displays additional data and settings in MSEsetup screens. The default setting for Supervisor mode is disabled.

Enabling Supervisor mode will display:

- System configuration screen
  - File options
  - Update firmware
  - Connect button
- Mastering screen
  - **Unapply all** button

- Setup screen
  - Hardware ID in the Module tab
  - Error compensation in the Channel tab
- Diagnostics screen
  - CPU temperature in the Module tab

Enable Supervisor mode

To enable Supervisor mode:

▶ Click the **Supervisor mode** button.

▶ Enter the "95148" for the supervisor password.

The updated setting is displayed in the Supervisor mode text box. A message verifying the action is displayed in the message area.

Disable Supervisor mode

To disable Supervisor mode:

▶ Click the **Supervisor mode** button.

The updated setting is displayed in the Supervisor mode text box. A message verifying the action is displayed in the message area.

7.4.5   Temperature units

The Temperature units setting is used for selecting the temperature unit of measure displayed in MSEsetup and included in transmitted or printed data. The default setting for Temperature units is Celsius.

Available temperature units:

- Celsius
- Fahrenheit

Select temperature units

To select the Temperature units:

▶ Click the **Temperature units** button. Clicking the button toggles between the Celsius and Fahrenheit options.

The updated setting is displayed in the Temperature units text box. A message verifying the action is displayed in the message area.

7.4.6   Virtual keypad

Enabling the virtual keypad allows touch screens to have text editing capabilities when clicking in editable data fields. The default setting for Virtual keypad is disabled.

Enable/disable Virtual keypad

To enable or disable the Virtual keypad:

▶ Click the **Virtual keypad** button. Clicking the button toggles between the Enabled and Disabled options.

The updated setting is displayed in the Virtual keypad text box. A message verifying the action is displayed in the message area.

7.4.7 Units of measurement

Units of measurement settings are used for selecting the linear and angular units of measure displayed in MSEsetup and included in transmitted or printed data for all encoders in the MSE 1000 module chain. Individual channel units can be to set to a different unit in the Setup screen.

Available units:

- Linear
  - mm
  - in
- Angular
  - deg
  - dms
  - rad

Select units of measurement

To select units of measurement:

▶ Click the **Units of measurement** button.

Units of measurement options are displayed at the top of the screen.

▶ Click the **Linear** drop down arrow and select a linear unit of measurement.

The updated setting is displayed in the Linear drop down box. A message verifying the action is displayed in the message area.

▶ Click the **Angular** drop down arrow and select an angular unit of measurement.

The updated setting is displayed in the Angular drop down box. A message verifying the action is displayed in the message area.

7.4.8   Diagnostics mode

Diagnostics mode options are used to set the diagnostics mode running inside MSE 1000 modules.

Disabling Diagnostics mode will speed up data capture when maximum throughput is desired.

Full diagnostics mode is enabled for a module when the Diagnostics screen is open and returned to the selected setting when the Diagnostics screen is exited.

Available diagnostics modes:

- Full
- Status
- Minimal
- Off

Select diagnostics mode

To select a diagnostics mode:

▶ Click the **Diagnostics mode** button.

Diagnostics mode options are displayed at the top of the screen.

▶ Click the **Diagnostics mode** drop down arrow and select a diagnostics mode.

The updated setting is displayed in the Diagnostics mode drop down box. A message verifying the action is displayed in the message area.

7.4.9 Display formats

Display format settings are used to select the way measurements are formatted when displayed in the Data screen and transmitted to the output file.

Selecting a display format applies the change to all channels in the MSE 1000 module chain that use that format. Individual channels can be to set to a different format in the Setup screen.

Available formats:

- Display resolution
  - 0.000005 ... 0.5
- Radix
  - Decimal
  - Comma
- Angle format
  - 360
  - 180 +/-
  - infinite +/-
  - 360 +/-

Select display formats
To select Display formats:

▶ Click the **Display formats** button.

Display formats options are displayed at the top of the screen.

▶ Click the **Display resolution** drop down arrow and select a display resolution.

The updated setting is displayed in the Display resolution drop down box. A message verifying the action is displayed in the message area.

▶ Click the **Radix** drop down arrow and select the radix type.

The updated setting is displayed in the Radix drop down box. A message verifying the action is displayed in the message area.

▶ Click the **Angle format** drop down arrow and select an angle format.

The updated setting is displayed in the Angle format drop down box. A message verifying the action is displayed in the message area.

7.4.10   Enable/disable prompts

Prompts that are used in MSEsetup can be enabled or disabled from the Enable/disable prompts screen.

Prompt types:

- **On exit:** Displays a prompt requesting verification to exit MSEsetup.
- **Save log on exit:** Displays a prompt on exit with the option to save the log file.
- **Open data spreadsheet on startup:** Opens a Microsoft Excel file on startup named Mse1000Data.xlsx. Data is transmitted to the spreadsheet when captured from the Data screen.

Enable/disable prompts

To enable or disable a prompt:

▶ Click the **Enable/disable** prompts button.

Enable/disable prompts options are displayed at the top of the screen.

▶ Click the button next to a prompt name to toggle between enabled and disabled.

A message verifying the action is displayed in the message area.

7.4.11   File options

The File options screen provides choices for managing MSEsetup configuration files. The system configuration can be saved, loaded, or restored. The module configuration can be saved, loaded, merged, or restored. The user directory location can be selected. File options is available only when supervisor mode is enabled.

Configuration file options:

- SystemConfig.xml
    - Save As
    - Load
    - Restore Defaults

- ModuleConfig.xml
    - Save As
    - Load
    - Merge
    - Restore Defaults

- User Directory
    - Select

System Configuration
A system configuration file can be saved as a backup or for saving multiple system configurations. System configurations can also be restored to factory default settings. The default system configuration file is SystemConfig.xml.

Save system configuration
To save a system configuration file:

▶ Click the **Save As** button under the SystemConfig.xml column.

The file dialog window opens.

▶ Use the File dialog window controls to select a location to save the configuration file.

▶ Enter a file name into the File name text box.

▶ Click the **OK** button.

The configuration file is saved to the selected location.

Load system configuration
To load a system configuration file:

▶ Click the **Load** button under the SystemConfig.xml column.

The file dialog window opens.

▶ Use the File dialog window controls to select a configuration file to load.

▶ Click the **OK** button.

A dialog window appears stating that MSEsetup will restart. A message verifying the action is displayed in the message area.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

Restore system configuration
To restore the system configuration:

▶ Click the **Restore Defaults** button.

A dialog window appears requesting confirmation to restore the system configuration file. A message verifying the action is displayed in the message area.

▶ Click the **OK** button.

A dialog window appears stating that MSEsetup will restart.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

Module Configuration

A module configuration file can be saved and used as a backup or for saving multiple module configurations. Module configurations can also be restored to factory default settings. The default module configuration file is ModuleConfig.xml.

Save module configuration

To save a module configuration file:

▶ Click the **Save As** button under the ModuleConfig.xml column.

The file dialog window opens.

▶ Use the File dialog window controls to select a location to save the configuration file.

▶ Enter a file name into the File name text box.

▶ Click the **OK** button.

The configuration file is saved to the selected location.

Load module configuration

To load a module configuration file:

▶ Click the **Load** button under the ModuleConfig.xml column.

The file dialog window opens.

▶ Use the File dialog window controls to select a configuration file to load.

▶ Click the **OK** button.

A dialog window appears stating that MSEsetup will restart. A message verifying the action is displayed in the message area.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

Merge module configuration

To merge all matching modules in a configuration file:

▶ Click the **Merge** button located under the ModuleConfig.xml column.

The Merge screen opens.

▶ Select **Entire chain** from the Merge type drop-down list.

▶ Use the File dialog window controls to select a configuration file to merge.

▶ Click the **OK** button.

A dialog window appears requesting whether it is OK to overwrite the configurable module settings.

▶ Click the **OK** button.

A dialog window appears stating that the ModuleConfig.xml file has changed and that MSEsetup will restart.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

To merge specific matching modules in a configuration file:

▶ Click the **Merge** button under the ModuleConfig.xml column.

The merge screen opens.

▶ Select **Serial number** from the Merge type drop-down list.

▶ Use the File dialog window controls to select a configuration file to merge.

▶ Select the desired modules to merge from the module list.

▶ Click the **OK** button.

A dialog window appears requesting whether it is OK to overwrite the configurable module settings.

▶ Click the **OK** button.

A dialog window appears stating that the ModuleConfig.xml file has changed and that MSEsetup will restart.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

Restore module configuration
To restore the module configuration to factory defaults:

▶ Click the **Restore Defaults** button under the ModuleConfig.xml column.

A dialog window appears requesting confirmation to restore the module configuration file. A message verifying the action is displayed in the message area.

▶ Click the **OK** button.

A dialog window appears stating that MSEsetup will restart.

▶ Click the **OK** button.

A dialog window appears requesting to back up the log file. Choose whether to back up the file and follow any additional on screen instructions. Once complete MSEsetup will restart.

User Directory
The location the User Directory button navigates to can be changed from the factory default location.

Select user directory
To select the user directory location:

▶ Click the **Select** button under the User Directory column.

The file dialog window opens.

▶ Use the File dialog window controls to select a location to use as the user directory.

▶ Click the **OK** button.

The User Directory location is saved and can be accessed using the User Directory button in the File dialog window.

7.4.12   Update firmware

The Update firmware screen provides options for updating the firmware and bootloader installed on MSE 1000 modules. Update firmware is available only when supervisor mode is enabled.

Update firmware

> ### NOTICE
>
> Do not update the firmware when Use DHCP addressing is enabled.
> **Further Information:** "Module Chain", page 84.

> ### NOTICE
>
> Programming the firmware with a version newer than v1.0.2 requires the bootloader be at least v1.0.2.
>
> The bootloader and firmware cannot be programmed to a version older than v1.0.3 once programmed to v1.0.3 or newer.

To update the module firmware:

▶ Click the **Open** button.

The file dialog window opens.

▶ Use the File dialog window controls to select a firmware file to load.

▶ Click the Module selection drop-down arrow and select a single module to update or **All** to update all modules.

Modules will not be programmed if the new version matches the current version when **All** is selected.

▶ If required, click the **Firmware/Bootloader** button and select Firmware.

▶ Click the **OK** button.

The firmware update begins. Refer to the status indicator for the current status of the update.

Update bootloader

> **NOTICE**
>
> Programming the bootloader is not recommended unless there is a mandatory update. If the bootloader is not programmed correctly the affected modules must be sent to HEIDENHAIN for service.

To update the module bootloader:

▶ Click the **Open** button.

The File dialog window opens.

▶ Use the File dialog window controls to select a bootloader file to load.

▶ Click the Module selection drop-down arrow and select a single module to update or **All** to update all modules.

Modules will not be programmed if the new version matches the current version when **All** is selected.

▶ If required, click the **Firmware/Bootloader** button and select Bootloader.

▶ Click the **OK** button.

The bootloader update begins. Refer to the status indicator for the current status of the update.

8   Commissioning and preparing to measure

8.1   Network configuration

MSEsetup communicates with MSE 1000 modules over Ethernet. The PC running MSEsetup is referred to as the Workstation and is the Client when communicating with the modules.

The workstation must have a Network Interface Controller (NIC) with a unique Internet Protocol (IP) address that is on the same subnetwork as the MSE 1000 modules. All MSE 1000 modules must also have a unique IP address.

Default IP addresses for similar module types are set the same from the factory and need to be reconfigured in order to communicate with MSEsetup. Workstation and MSE 1000 module IP address configurations and other network settings and operations are located in the Connect screen.

Model	Default IP address	Default netmask
MSE 120x	172.31.46.2	255.255.255.0
MSE 11xx, MSE 13xx, MSE 1401, MSE 1501	172.31.46.1	

8.1.1   Connect screen

The Connect screen is available without a password when MSEsetup is opened for the first time. All subsequent MSEsetup sessions require enabling Supervisor mode to access the Connect screen.

Available options:

- Workstation IP
  - IP address
  - Netmask
  - Port
  - Async. Port
- Connection
  - Disconnect
  - Reconnect
  - Broadcast

- Individual Module IP
  - Query
  - Set Static

- Module chain
  - Use DHCP Addressing
  - Use Static Addressing
  - Restore Factory Defaults

Connect screen

Connect button

To open the Connect screen:

▶ Click the **Config** button.
▶ Click the **Supervisor mode** button.
▶ Enter the supervisor password into the Password field.
▶ Click the **Connect** button.

8.1.2   Workstation IP

Workstation IP options set the IP address, netmask and port used for communication between the workstation and the MSE 1000 modules. All changes are saved to the System Configuration file.

Select IP address
The first drop-down list shows the available IP addresses of the workstation. The IP address of the workstation NIC connected to the MSE 1000 base module should be chosen from the list. If it exists, the default subnetwork is 172.31.46. This is the default subnetwork assigned to MSE 1000 modules.

> **i**   The workstation IP address will not appear if the network cable is not attached to a powered router or the MSE 1000 base module.

To select the workstation IP address:

▶ Click the IP address drop-down arrow.

▶ Select the IP address assigned to the workstation NIC that is connected to the MSE base module.

A message verifying the change is displayed in the Connect screen message area.

Select netmask
The second drop-down list shows the netmask options. This option only needs to be modified if the modules are changed by DHCP. The default netmask is 255.255.255.0.

To select a Netmask:

▶ Click the netmask drop-down arrow.

▶ Select the required netmask.

Set Port

The Port number is used to receive messages from MSE 1000 modules on the selected IP address. This option only needs to be modified if there is another application using the same IP address and port number.

The port number must be between 1024 - 49151 and cannot be 27015 or 27300. Port number 27015 is reserved for use by modules. Port number 27300 is reserved for asynchronous messaging from modules. The default port number is 27016.

To set the Port:

▶ Enter a port value into the Port field.

▶ Click the **Port** button.

A message verifying the change is displayed in the Connect screen message area.

Set Asynchronous Port

The Asynchronous Port number is used to receive asynchronous messages from MSE 1000 modules on the workstation IP address. This option only needs to be modified if there is another application using the same IP address and asynchronous port number.

The asynchronous port number must be between 1024 - 49151 and cannot be the same as the port. For information on the port, see "Set Port", page 80. The default asynchronous port number is 27300.

To set the Asynchronous Port:

▶ Enter a port value into the Async. Port field.

▶ Click the **Async. Port** button.

▶ A dialog window appears asking if the port should be changed.

▶ Click the **OK** button.

▶ A dialog window appears stating that MSEsetup will restart. A message verifying the action is displayed in the message area.

▶ Click the **OK** button.

8.1.3   Connection

Connection options are used to open or close a communication connection between the workstation and the MSE 1000 modules.

Disconnect
The Disconnect option will close the communication connection between the workstation and the MSE 1000 modules. MSEsetup can still be used for viewing logs, configuring network settings, and modifying MSEsetup configurations when disconnected. This choice is not available if a successful Broadcast has not been performed.

To Disconnect:

▶ Press the **Disconnect** button.

A message verifying the connection status is displayed in the Connect screen message area.

Reconnect
The Reconnect option will attempt to open a communication connection between the workstation and the MSE 1000 modules based on the last known module chain configuration. This choice is not available if a successful Broadcast has not been performed.

To reconnect:

▶ Press the **Reconnect** button.

A message verifying the connection status is displayed in the Connect screen message area.

Broadcast
The Broadcast option sends out a Limited or Directed broadcast requesting a connection with the MSE 1000 modules. A limited broadcast sends out a connection request over all connected networks using the IP limited broadcast address of 255.255.255.255. A directed broadcast sends out a connection request to the subnetwork selected in Workstation IP. A limited broadcast is sent by default.

> **i**   A directed broadcast is recommended when multiple networks are connected to a single switch. If a limited broadcast is sent, each module will respond multiple times and cause an incorrect number of modules to be found.

Limited broadcast

To send a limited broadcast:

▶ Select the 255.255.255.255 netmask from the Broadcast netmask drop-down list.

▶ Click the **Broadcast** button.

A dialog box displays the number of modules found.

▶ Click the **OK** button to overwrite the configurable module settings from a backup file or click the **Cancel** button to proceed without overwriting the settings.

A message verifying that broadcasting is finished is displayed in the Connect screen message area.

Directed broadcast

To send a directed broadcast:

▶ Select a directed broadcast netmask option from the Broadcast netmask drop-down list.

Direct broadcast netmask options:

- 255.255.255.0
- 255.255.0.0
- 255.0.0.0

The Workstation IP is masked with the value in the drop-down list to localize the broadcast to a specific subnetwork.

▶ Click the **Broadcast** button.

A dialog box displays the number of modules found.

▶ Click the **OK** button to overwrite the configurable module settings from a backup file or click the **Cancel** button to proceed without overwriting the settings.

A message verifying that broadcasting is finished is displayed in the Connect screen message area.

8.1.4   Individual Module IP

Individual Module IP options are used for querying or setting a static IP address for a specific module in the module chain. The Query option is available even when there is not an active connection between the workstation and the MSE 1000 modules.

> **ℹ** The workstation NIC and MSE 1000 base module must be connected with an ethernet cable for Individual Module IP options to function.

Select a module with an active connection
The Individual Module IP drop-down list is available when there is an active communication connection between the workstation and the MSE 1000 modules.

To select a module from the drop-down list:

▶ Click the Individual Module IP drop-down arrow and select a module from the list.

Select a module without an active connection
Individual Module IP text fields are enabled when there is not an active connection between the workstation and the MSE 1000 modules. Which text fields are enabled is determined by the Workstation IP netmask setting. Values automatically entered in disabled text fields are determined by the IP address and the netmask specified in the Workstation IP option.

To select a module by IP address:

▶ Click inside an enabled text field and enter the required value to communicate with a specific module. Repeat this step until all text fields have the required value entered.

Query a module
The Query option sends a request to the selected module to determine the module type. This is useful for testing if MSEsetup can communicate with a specific module.

To query a module:

▶ Select a module using one of the methods described above.
▶ Click the **Query** button.

Query results will be displayed in the Connect screen message area.

Set static IP address
The Set Static option sends a request to the selected module to change the static IP address to the value specified in the Set Static text fields. Which text fields are enabled is determined by the Workstation IP netmask setting. An active connection is required when setting a static IP address.

To set a static IP address:

▶ Click the Individual Module IP drop-down arrow and select a module from the list.
▶ Click inside an enabled Set Static text field and enter the desired value. Repeat this step until all Set Static text fields have the desired value entered.
▶ Click the **Set Static** button.

MSEsetup sets the static IP address and performs a reconnect to the modules.

8.1.5 Module Chain

Module Chain options are used to select Dynamic Host Configuration Protocol (DHCP) or Static IP addressing and to restore module IP address settings to factory default values.

Static addressing
The Use Static Addressing option is available when modules are set to DHCP addressing. This option will send a request to all modules in the module chain to set them to static addressing.

To use static addressing:

▶ Click the **Use Static Addressing** button.

A dialog box confirms that all modules have been set to static addressing.

▶ Cycle power for the entire module chain by turning the power off and then back on.

▶ Wait for the Network LED to flash twice per second on all modules.

▶ Click the **OK** button in the dialog box.

MSEsetup performs a broadcast. A dialog box confirms the number of modules found.

▶ Click the **OK** button in the dialog box to overwrite the configurable module settings with a backup file or the **Cancel** button to skip overwriting the settings.

A message is displayed in the Connect screen message area when broadcasting is finished.

DHCP addressing
The Use DHCP Addressing option is available when modules are set to static addressing. This option will send a request to all modules in the module chain to set them to DHCP addressing.

Further Information: "Configuring the module chain with DHCP", page 87.

i	DHCP addressing requires a router with a Dynamic Host Configuration Protocol (DHCP) server to be connected between the workstation and the MSE 1000 base module.

To use DHCP addressing:

▶ Click the **Use DHCP Addressing** button.

A dialog box confirms that all modules have been set to DHCP addressing.

▶ Cycle power for the entire module chain by turning the power off and then back on.

The Network LED on each module will flash five times per second while waiting for DHCP to assign an IP address. The Network LED on each module will flash twice per second when an address has been assigned.

▶ Wait for the Network LED to flash twice per second on all modules.

▶ Click the **OK** button in the dialog box.

MSEsetup performs a broadcast. Each modules Network LED will flash twice per second until MSEsetup obtains a connection to the module. A dialog box confirms the number of modules found.

▶ Click the **OK** button in the dialog box to overwrite the configurable module settings with a backup file or the **Cancel** button to skip overwriting the the settings.

A message is displayed in the Connect screen message area when broadcasting is finished.

Restore factory defaults

The Restore Factory Defaults option sets all of the modules in the module chain to the factory default network settings.

Default network settings:

Module	IP address	Subnet	Asynchro-nous port	Addressing
MSE 120x	172.31.46.2	255.255.255.0	27300	DHCP
MSE 11xx, MSE 13xx, MSE 1401, MSE 1501	172.31.46.1			

To restore factory defaults:

▶ Click the **Restore Factory Defaults** button.

A dialog box requests confirmation to restore the modules to factory default settings.

▶ Click the **OK** button.

▶ Cycle power for the entire module chain by turning the power off and then back on.

The Network LED on each module will flash five times per second while waiting for DHCP to assign an IP address. The Network LED on each module will flash twice per second when an address has been assigned.

If a router with a DHCP server is not used the modules need to be manually programmed to unique static addresses.

Further Information: "Configuring the module chain manually", page 89.

▶ Wait for the Network LED to flash twice per second on all modules.

▶ Click the **OK** button in the dialog box.

MSEsetup performs a broadcast. Each modules Network LED will flash twice per second until MSEsetup obtains a connection to the module. A dialog box confirms the number of modules found.

▶ Click the **OK** button in the dialog box to overwrite the configurable module settings with a backup file or the **Cancel** button to skip overwriting the the settings.

A message is displayed in the Connect screen message area when broadcasting is finished.

8.1.6   Firewall configuration

MSEsetup uses the UDP protocol for communication with MSE 1000 modules. By default firewalls may block UDP messages. Network firewall settings may need to be configured to allow UDP on the ports used by MSEsetup and MSE 1000 modules. Refer to the documentation provided with the firewall software for additional information.

MSE port assignments:

MSE component	Port	
MSEsetup	27016	The port can be changed in the Connect screen.
		Further Information: "Workstation IP", page 79.
MSE 1000 modules	27015	This port cannot be changed.
MSEsetup asynchronous thread	27300	The port can be changed in the Connect screen.
		Further Information: "Workstation IP", page 79.

8.1.7   Configuring the module chain with DHCP

Dynamic Host Configuration Protocol (DHCP) can be used to dynamically assign IP addresses to MSE 1000 modules. A router with DHCP enabled must be connected between the workstation and the MSE 1000 base module. The DHCP server will assign each module a unique IP address. MSE 1000 modules are set to use DHCP by default.

> **ℹ** Use DHCP to assign the workstation IP address to avoid duplicate addresses. Refer to the PC's Operating Instructions to configure the workstation to use DHCP.

DHCP router configuration
To configure a DHCP router:
▶ Connect to the router through the router utility. This is usually a web browser. Refer to the documentation provided with the router for instructions.
▶ Set the IP address of the router to a unique value on the 172.31.46 subnet. Do not use 172.31.46.1 or 172.31.46.2, these are reserved for the modules when set to factory defaults.
▶ Set the netmask to 255.255.255.0.
▶ Verify the gateway acts as a DHCP server.
▶ Set the address range starting and ending address so that they do not include 172.31.46.1 or 172.31.46.2.
▶ Set the lease time to Forever.
▶ Disable SNTP if it is a feature of the router.

DHCP module chain configuration
To configure the module chain using DHCP:

> **ℹ** All modules must have DHCP enabled to perform this operation.
> **Further Information:** "Module Chain", page 84.

▶ Clear the DHCP router IP address lookup table. Refer to the router operating instructions for details.
▶ Install the first power supply module, base module, and up to 8 additional modules.

⚠ **CAUTION**

Observe the power consumption ratings of the modules and any devices connected to a module. Insert an additional power supply module as required.

Further Information: "Module specifications", page 167.

▶ Turn the power on.

The power LED's on each module should light solid green. Network LED's initially flash green five times per second when waiting for DHCP to assign an IP address.

▶ Wait for the Network LED to flash green twice per second on all modules.

▶ Perform a broadcast, see "Connection", page 81.

▶ Click the **OK** button in the dialog box when asked to switch to static addressing.

▶ Turn the power off.

▶ Install up to ten more modules into the module chain.

▶ Turn the power on.

▶ Wait for the Network LED to flash green twice per second on all modules.

▶ Perform a broadcast.

▶ Click the **OK** button in the dialog box when asked to switch to static addressing.

▶ Repeat turning the power off, installing up to ten modules, turning the power on, broadcasting, and switching to static addressing until all modules in the module chain have a unique IP address.

8.1.8   Configuring the module chain manually

The MSE 1000 module chain must be configured manually when a DHCP enabled router is not used.

> ℹ️ An RJ-45 crossover cable may be required when connecting the workstation directly to the base module. Refer to the documentation provided with the NIC for additional information.

Configure the power supply and base module

The power supply and base module must be configured first when configuring the module chain manually.

To configure the power supply and base module manually:

▶ Install the first power supply module and the base module.
▶ Turn the power on.

The power LED's on each module should light solid green. Network LED's initially flash green five times per second when waiting for DHCP to assign an IP address. After a 45 second timeout the modules will stop waiting for DHCP to assign an IP address and the Network LED's on each module will flash green twice per second.

▶ Wait for the Network LED to flash twice per second on all modules.
▶ Select the power supply module from the Individual Module IP drop-down list.
▶ Assign the power supply module a unique static IP address, see "Individual Module IP", page 83.
▶ Assign the base module a unique static IP address.
▶ Configure the module chain to use static IP addresses, see "Module Chain", page 84.
▶ Verify that the IP address for each module has been changed to the new static IP address value.

Configure additional modules

MSE 1000 modules must be configured one at a time when configuring the module chain manually.

To configure additional modules:

▶ Turn the power off.
▶ Install the next module into the module chain.
▶ Turn the power on.
▶ Wait for the Network LED to flash twice per second on all modules.
▶ Perform a broadcast, see "Connection", page 81.

If the new module is configured to use DHCP addressing (default) a dialog box will appear asking to configure the new module to use static addressing.

▶ Click the **OK** button to switch to static addressing.

A dialog box confirms the module has been configured to use static addressing.

▶ Cycle the power. Turn the power off, wait 20 seconds then turn the power on.
▶ Wait for the Network LED to flash twice per second on all modules.
▶ Click the **OK** button in the dialog box.

A dialog box displays the number of modules found.

▶ Click the **OK** button to overwrite the configurable module settings from a backup file or click the **Cancel** button to proceed without overwriting the settings.
▶ Assign the new module a unique static IP address.
▶ Repeat this process until all required modules are configured into the module chain.

8.2   Module setup

The Module setup tab provides options to change the label used to identify a module and the ability to activate or deactivate a module. Hardware, firmware and network information specific to the selected module is also displayed.

The Setup screen for an LVDT module provides a button for accessing a calibration screen. The LVDT calibration screen provides options for updating the excitation voltages and for configuring the channel resolutions from a single location.

Module tab information:

- Module label
- Model
- Module ID
- Hardware ID
- Bootloader version

- Firmware version
- Serial number
- Using DHCP
- IP address
- IP address (static)

- Netmask
- Netmask (static)
- MAC address
- Active
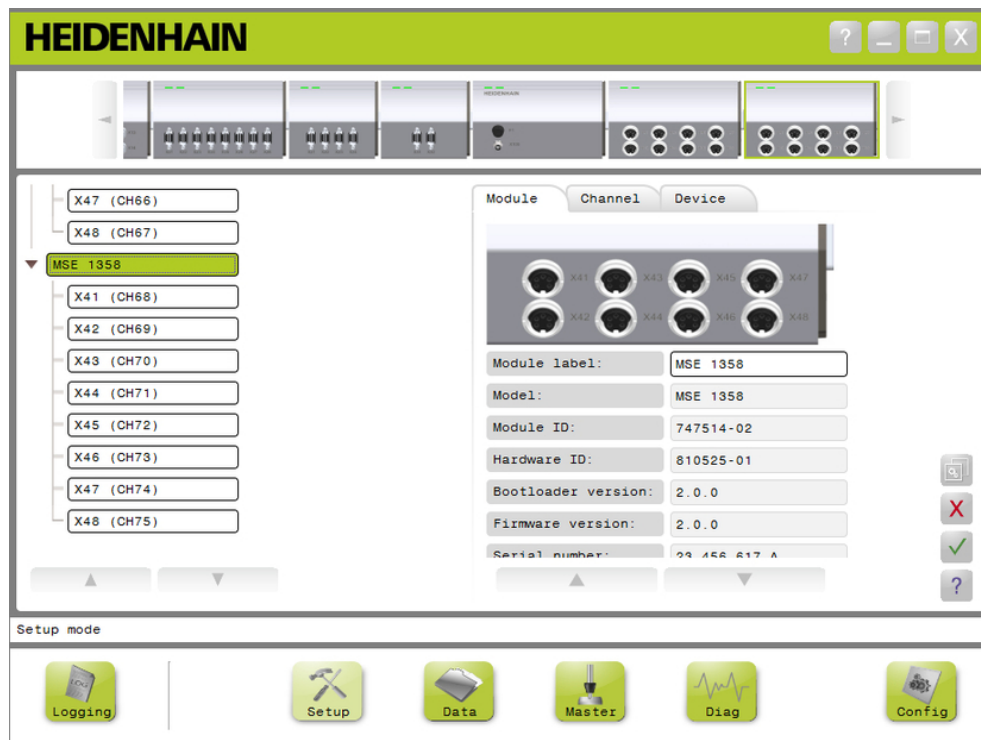
Module setup tab

To view Module setup options:

▶ Click the **Setup** button.
▶ Select a module from the Tree or the Module view.

The Module setup tab for the selected module appears in the Setup screen.

Change Module label

The Module label is a unique name that can be assigned to a module to help identify it from other modules in the module chain. The module model number is assigned as the default label. A maximum of 13 characters may used for the label.

To change the Module label:

▶ Click inside the Module label text field.

▶ Delete the current label.

▶ Enter a unique name for the module.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Activate/deactivate module

A module can be deactivated and left in the module chain and later reactivated. This is useful if data is not required for a specific task, but is needed for others at a later time. When a module is deactivated it is no longer polled for updates. Deactivated modules are removed from the Data and Mastering screens and their diagnostic data is not available. Module View will show the inactive module in a lighter tint.

To change the active status of a module:

▶ Click **Active** toggle button to change the active status.

▶ Click the **OK** button.

8.2.1   LVDT calibration

LVDT calibration information:

- ■ Teach resolutions
- ■ Set Excitation Frequency
- ■ Set Excitation Voltage
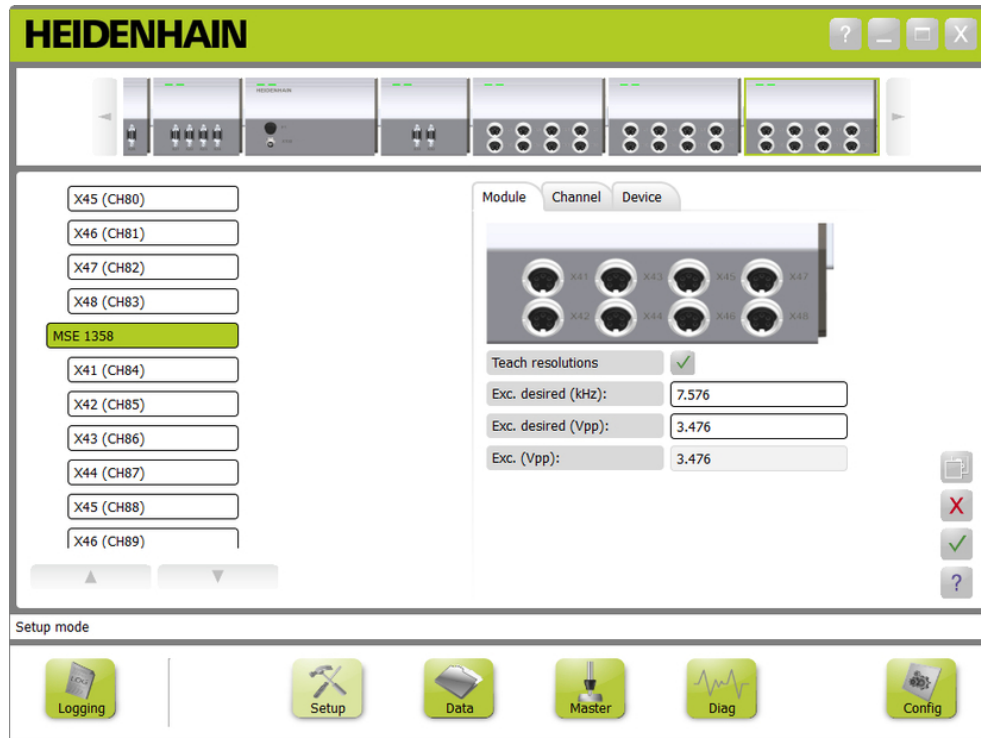
LVDT calibration screen

To view the LVDT calibration screen:

- ▶ Click the **Setup** button.
- ▶ Select an LVDT module from the Tree or the Module view.
- ▶ Click the **calibration** button.
- ▶ The LVDT setup screen for the selected module appears.

Set excitation frequency
The excitation frequency is used to supply the correct frequency for all of the sensors connected to an LVDT module. Sensors that require different excitation frequencies require a separate LVDT module or they will not run at optimum performance. The desired frequency should be obtained from the sensor manufacturer documentation. LVDT modules are preset to default values. The excitation frequency must be a value from 3.0 to 50.0 kHz.

To change excitation frequency:

▶ Click inside the Exc. desired (kHz) text field.
▶ Delete the current excitation frequency.
▶ Enter the desired value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

The Exc. (Vpp) will be updated with the new voltage that is being used in the module. This value is affected by both the excitation voltage and the excitation frequency.

Set excitation voltage
The excitation voltage is used to supply the correct voltage for all of the sensors connected to the module. Sensors that require different excitation voltages require a separate module or else they will not run at their optimum performance. The desired voltage should be obtained from the manufacturer of the sensor. LVDT modules are preset to default values. The excitation voltage must be a value from 1.5 to 5.5 V.

To change excitation voltage:

▶ Click inside the Exc. desired (Vpp) text field.
▶ Delete the current excitation voltage.
▶ Enter the desired value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

The Exc. (Vpp) will be updated with the new voltage that is being used in the module. This value is affected by both the excitation voltage and the excitation frequency.

8.2.2   LVDT Teach resolutions

The LVDT Teach resolutions screen is used to convert the voltage value returned from an LVDT sensor into millimeters or inches. The conversion is done by interpolating the voltage based on the minimum and maximum physical position of the sensor. The Teach resolutions screen configures all of the sensors connected to a single LVDT module. LVDT sensors can be configured individually from the Setup screen channel and device tabs. Teach resolutions only applies to a channel that has a sensor assigned to it.

Teach resolutions information:

- Min (mm) or Min (in)
- Max (mm) or Max (in)
- Sensor output (V)
- Res. (mm/V) or Res. (in/V)
- Calibration timestamp
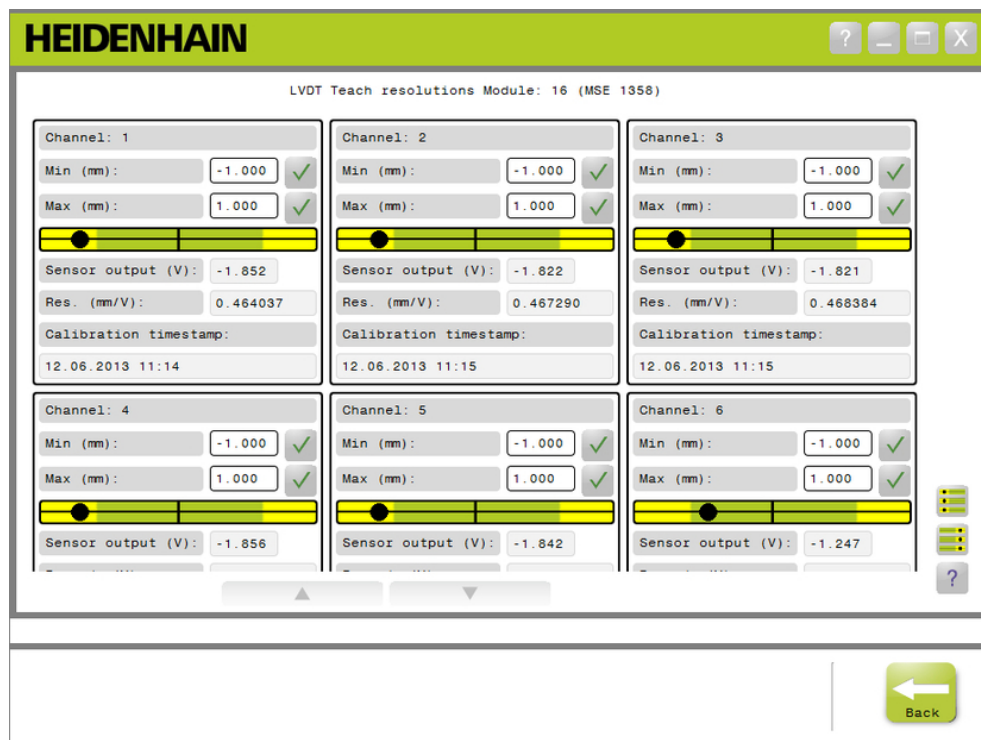
LVDT Teach resolutions screen

To view the LVDT Teach resolutions screen:

▶ Click the **Setup** button.
▶ Select an LVDT module from the Tree or the Module view.
▶ Click the **Calibration** button.
▶ Click the **OK** button to the right of Teach resolutions.

The LVDT Teach resolutions screen for the selected module appears.

Teach resolution for a single sensor

To teach the resolution for a single sensor:

▶ Use a gage block to position the sensor so that the Sensor output (V) value shows as close to 0.0 as possible.

▶ Move the sensor to the minimum mechanical position

▶ Click inside the Min (mm) or Min (in) field and enter the distance that was traveled from the 0.0 position.

▶ Click the **OK** button to the right of the Min (mm) or Min (in) field.

▶ Use a gage block to position the sensor so that the Sensor output (V) value shows as close to 0.0 as possible.

▶ Move the sensor to the maximum mechanical position.

▶ Enter the distance that was traveled from the 0.0 position in the Max (mm) or Max (in) field.

▶ Click the **OK** button to the right of the Max (mm) or Max (in) field.

The resolution that will be used to convert from volts to millimeters or inches will be displayed in the Res. (mm/V) or Res. (in/V) field.

The Calibration timestamp is updated.

Teach resolution for all sensors

To teach the resolution for all sensors:

▶ Use gage blocks to position all of the sensors so that the Sensor output (V) values show as close to 0.0 as possible.

▶ Move all of the sensors to their minimum mechanical positions.

▶ Click inside each Min (mm) or Min (in) field and enter the distance that was traveled from the 0.0 position.

▶ Click the **SetAllMin** button.

▶ Move all of the sensors to their maximum mechanical positions.

▶ Click inside each Max (mm) or Max (in) field and enter the distance that was traveled from the 0.0 position.

▶ Click the **SetAllMax** button.

The resolutions that will be used to convert from volts to millimeters or inches will be displayed in the Res. (mm/V) or Res. (in/V) fields.

The Calibration timestamps are updated.

8.3   Channel setup

The Channel setup tab provides options for configuring individual channels on a module. Settings options are not visible if a device is not connected to a channel or the connected device does not support the option.

EnDat encoder types are automatically recognized when an EnDat encoder is connected to a module channel.

1 V_{PP}, LVDT, TTL, and analog devices must be manually assigned when a device is connected to a module channel and manually removed if the encoder is disconnected from the module.

Input and output (I/O) channel assignments are created regardless of an active connection to the channel. The channel assignment can be removed if an input or output is not being used and reassigned if the channel is being used at a later time.

Compressed air channel assignments are created regardless of an active connection to the channel.

Channel tab information:

- Channel label
- Display resolution
- Unit of Measurement

- Angle format
- Error compensation
- Scale Factor

- Counting Direction
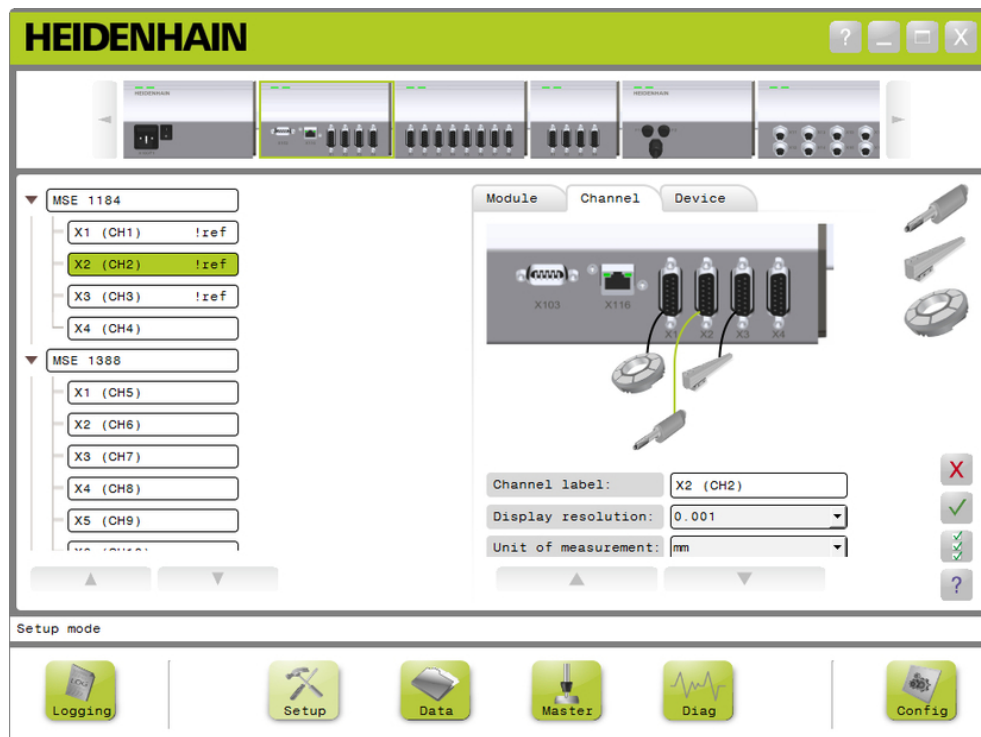
Channel setup tab

To view channel setup options:

▶ Click the **Setup** button.

▶ Select a channel from the Tree.

The Channel setup tab for the selected channel appears in the Setup screen.

Assign 1 V$_{PP}$ or TTL encoder type

1 V$_{PP}$ and TTL encoder types are selected from a graphic list located on the right side of the Setup screen content area when the Channel tab is selected.

Available 1 V$_{PP}$ and TTL encoder types

■ Length gauge

■ Linear encoder

■ Rotary encoder

To assign a 1 V$_{PP}$ or TTL encoder type:

▶ Click and hold on the desired encoder graphic located in the graphic list.

Available channels appear as labeled green squares below the module graphic in the Channel tab.

▶ Drag the selected encoder graphic over the desired channel square and release the button.

The selected encoder graphic appears below the module with a line connecting the encoder to the channel.

Remove 1 V$_{PP}$ or TTL encoder assignment

To remove a 1 V$_{PP}$ or TTL encoder type assignment:

▶ Click and hold on the desired encoder graphic located below the module graphic in the Setup tab.

▶ Drag the selected encoder graphic away from its current location.

The encoder graphic is replaced with the Delete icon.

▶ Release the button.

The selected encoder is removed from the channel assignment.

Assign LVDT sensor

The LVDT sensor icon is located on the right side of the Setup screen content area when the Channel tab is selected.

To assign an LVDT sensor:

▶ Click and hold on the sensor graphic located on the right side of the screen.

Available channels appear as labeled green squares below the module graphic in the Channel tab.

▶ Drag the selected sensor graphic over the desired channel square and release the button.

The selected sensor graphic appears below the module with a line connecting the sensor to the channel.

Remove LVDT Sensor

To remove an LVDT sensor assignment:

▶ Click and hold on the desired sensor graphic located below the module graphic in the Setup tab.

▶ Drag the selected sensor graphic away from its current location.

The sensor graphic is replaced with the Delete icon.

▶ Release the button.

The selected sensor is removed from the channel assignment.

Assign analog device type

Analog device types are selected from a graphic list located on the right side of the Setup screen content area when the Channel tab is selected.

Available analog device types:

- Length gauge utilizing current
- Length gauge utilizing voltage
- Linear encoder utilizing current
- Linear encoder utilizing voltage
- Rotary encoder utilizing current

- Rotary encoder utilizing voltage
- Current source
- Voltage source
- Potentiometer utilizing current
- Potentiometer utilizing voltage

- Temperature sensor utilizing current
- Temperature sensor utilizing voltage
- Pressure sensor utilizing current
- Pressure sensor utilizing voltage

To assign an analog device type:

▶ Click and hold on the desired device graphic located in the graphic list.

Available channels appear as labeled green squares below the module graphic in the Channel tab.

▶ Drag the selected device graphic over the desired channel square and release the button.

The selected device graphic appears below the module with a line connecting the encoder to the channel.

Remove Analog device type assignment
To remove an analog device type assignment:
▶ Click and hold on the desired device graphic located below the module graphic in the Setup tab.
▶ Drag the selected device graphic away from its current location.
▶ The device graphic is replaced with the Delete icon. Release the button.
The selected device is removed from the channel assignment.

Assign I/O type
I/O types are selected from a graphic list located on the right side of the Setup screen content area when the Channel tab is selected. MSEsetup will not allow a module channel to be assigned a conflicting I/O type.
Available I/O types:
■ Input
■ Output
To assign an I/O type:
▶ Click and hold on the required I/O graphic located in the graphic list.
Available channels appear as labeled green squares below the module graphic in the Channel tab.
▶ Drag the I/O graphic over the desired channel square and release the button.
The I/O graphic appears below the module with a line connecting the graphic to the selected channel.

Remove I/O assignment
To remove an I/O channel assignment:
▶ Click and hold on the desired I/O graphic located below the module graphic in the Setup tab.
▶ Drag the selected I/O graphic away from its current location.
The I/O graphic is replaced with the Delete icon.
▶ Release the button.
The selected I/O is removed from the channel assignment.

Change Channel label
The Channel label is a unique name that can be assigned to a channel to help identify it from other channels in the Tree. The channel designator printed on the module plus a channel number created during a broadcast is assigned as the default label. A maximum of 13 characters may used for the label.
To change a Channel label:
▶ Click inside the Channel label text field.
▶ Delete the current label.
▶ Enter a unique name for the channel.
▶ Click the **OK** button.
A message verifying the action is displayed in the message area.

Select display resolution

The Display resolution setting is used to select the resolution value of the channel when displayed in the Data and Master screens.

To select a display resolution:

▶ Click the Display resolution drop-down arrow and select the desired value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Select Unit of measurement

The Unit of measurement setting is used to select the units that a channel will be displayed in.

Unit of measurement options:

- mm
- in
- deg
- dms
- rad

- none
- V
- mA
- °F
- °C

- mbar
- kPa
- psi

To select a unit of measurement:

▶ Click the Unit of measurement drop-down arrow and select the desired value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Select channel angle format

The Angle format setting is used to select the format that angle measurements for rotary encoders will be displayed in.

Angle format options:

- 360
- 180+/-

- infinite +/-
- 360 +/-

To select an angle format:

▶ Click the Angle format drop-down arrow and select the desired value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Set error compensation
Error compensation is a linear multiplier that is used to correct for small errors in the encoder position. Error compensation is available only when supervisor mode is enabled.

To set error compensation:

▶ Click inside the Error compensation text field.
▶ Delete the current value.
▶ Enter the required compensation value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Set scale factor
The scale factor is a linear multiplier used to handle gear ratios and other factors that will change encoder position. The scale factor is applied after the error compensation.

To set a scale factor:

▶ Click inside the Scale factor text field.
▶ Delete the current value.
▶ Enter the required scale factor value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Select counting direction
The counting direction is used to show the direction of the position. This value is read-only for EnDat encoders and can be selected for 1 V_{PP} encoders. A negative choice for a 1 V_{PP} encoder will invert the sign of the position.

Counting direction options:

■ Positive
■ Negative

To select a counting direction:

▶ Click the Counting direction drop-down arrow and select the desired value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

8.4   Device setup

The Device setup tab displays information specific to the device connected to the selected channel and options for configuring EnDat, 1 V$_{PP}$, LVDT, TTL, and analog devices. Information and options are not visible if they are not supported by the device.

Device tab information and options:

- ID
- Serial number
- Type
- Error monitoring
- Reference mark
- Signal period

- Line count
- Interpolation
- Resolution
- Calibration timestamp
- Recalibration timer
- Sensor output

- Teach gain
- Gain code
- Signal min
- Signal max
- Measured min
- Measured max
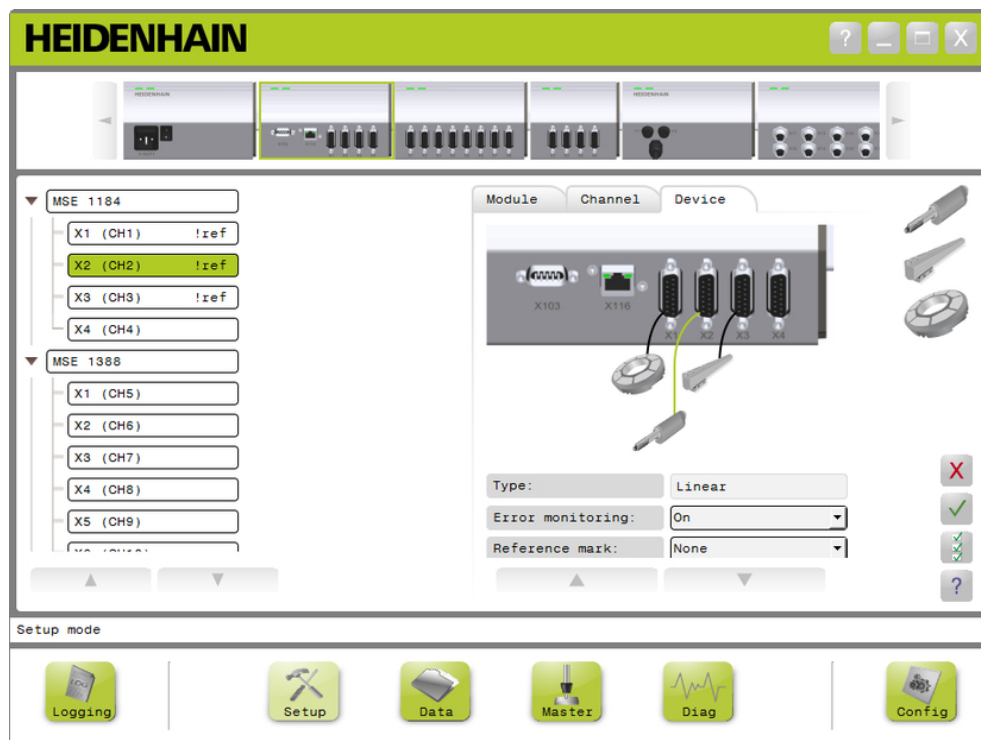
Device setup tab

To view device setup options:
- ▶ Click the **Setup** button.
- ▶ Select a channel from the Tree.
- ▶ Click the Device tab.

Device information and options are displayed for the selected channel.

Enable/disable error monitoring

Error monitoring checks for missing counts and other errors internal to a module.

Diagnostic screen information will be updated when error monitoring is enabled.

Disabling error monitoring is useful for increasing communication speed with EnDat v2.2 encoders. Function reserves, errors, and warnings will not be monitored when disabled.

To enable error monitoring:

▶ Click the Error monitoring drop-down arrow.

▶ Select **On** from the drop-down list.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

To disable error monitoring:

▶ Click the Error monitoring drop-down arrow.

▶ Select **Off** from the drop-down list.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Select reference mark

The reference mark setting is used with 1 V_{PP} and TTL encoders. Reference marks are used to re-establish datum positions after a power interruption.

The following table represents a partial list of HEIDENHAIN encoders. This table describes the reference mark parameters that must set for the encoders. Most entries can be found in the operating instructions for the encoder.

To select a reference mark:

▶ Click the Reference mark drop-down arrow and select the required value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Select signal period

The signal period is based on the type of 1 V_PP or TTL linear encoder connected to the channel. The signal period is used to convert the count returned from the encoder to a linear position. Refer to the documentation provided with the device for the correct signal period setting.

To select a signal period:

▶ Click the signal period drop-down arrow and select the desired value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

1 V$_{pp}$ encoder	Signal period	Reference marks
ST 128x	20 µm	Single
ST 308x	20 µm	Single
LS 388C	20 µm	Coded/1000
LS 688C	20 µm	Coded/1000
LS 187 LS 187C	20 µm 20 µm	Single Coded/1000
LS 487 LS 487C	20 µm 20 µm	Single Coded/1000
LB 382C	40 µm	Coded/2000
LF 183 LF 183C	4 µm 4 µm	Single Coded/5000
LF 483 LF 483C	4 µm 4 µm	Single Coded/5000

TTL Encoder	Resolution	Signal period	Interpolation factor	Reference marks
LS 177 LS 477	1 µm 0.5 µm 0.25 µm	20 µm 20 µm 20 µm	5-fold 10-fold 20-fold	Single Single Single
LS 177C LS 477C	1 µm 0.5 µm 0.25 µm	20 µm 20 µm 20 µm	5-fold 10-fold 20-fold	Coded/1000 Coded/1000 Coded/1000
LS 328C LS 628C	5 µm	20 µm	n/a	Coded/1000
LS 378C	1 µm 0.5 µm 0.25 µm	20 µm 20 µm 20 µm	5-fold 10-fold 20-fold	Coded/1000 Coded/1000 Coded/1000

Assign line count

The line count is based on the type of 1 V_{PP} or TTL rotary encoder used. The line count is used to convert the count returned from the encoder to a rotary position. Refer to the documentation provided with the device for the correct line count setting.

To assign a line count:

▶ Click inside the Line count text field.

▶ Delete the current value.

▶ Enter the required line count value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Assign interpolation

The interpolation setting is used with TTL encoders. The interpolation is used in conjunction with the signal period or line count when converting the count returned from the encoder to a position.

To assign the interpolation:

▶ Click the Interpolation drop-down arrow and select the required value.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Teach gain

Teaching gain is used with LVDT sensors. Teaching gain sends a command to the LVDT module to determine the optimal gain value. The gain value is used to select the best voltage range for the sensor.

To teach the gain:

▶ Click the **OK** button to the right of the Teach gain text field.

A dialog window appears requesting to hold the sensor at the minimum position.

▶ Hold the sensor at the minimum position and click the **OK** button.

A dialog window appears requesting to hold the sensor at the maximum position.

▶ Hold the sensor at the maximum position and click the **OK** button.

A dialog window appears requesting to hold the sensor at either the minimum or the maximum position.

▶ Hold the sensor at the minimum or maximum position and click the **OK** button.

A dialog window appears informing if the teach gain passed or failed.

The Gain code will be updated with the new value.

Set gain code
Setting the gain code is used with LVDT sensors. The gain value should be taught first and setting the gain should be used if more or less resolution is desired. The position may not be as stable when too much resolution is used. Setting the gain to a value that is too small may not give enough resolution.

To set the gain code :
▶ Click inside the Gain code text field.
▶ Delete the current value.
▶ Enter the new value.
▶ Click the **OK** button.

A dialog window appears requesting to hold the sensor at the min position.
▶ Click the **Cancel** button if only the gain code needs to be set, otherwise click the **OK** button and set the minimum and maximum positions.

Set measured minimum or maximum
The measured minimum and measured maximum value is used with analog devices and LVDT sensors. The calculation of the resolution for analog devices will be done by interpolating the signal minimum and signal maximum over the measured minimum and measured maximum. The calculation of the resolution for LVDT sensors will be done by prompting the user to move the sensor to the mechanical minimum and maximum before interpolating.

To set the measured minimum and maximum values for analog devices:
▶ Click inside the Measured min. text field.
▶ Delete the current value.
▶ Enter the minimum value.
▶ Click inside the Measured max. text field.
▶ Delete the current value.
▶ Enter the maximum value.
▶ Click the **OK** button.

The resolution will be updated with the interpolated value.

The calibration time-stamp will be updated with the current date and time.

A message verifying the action is displayed in the message area.

To set the measured minimum and maximum values for LVDT sensors:
▶ Click inside the Measured min. text field.
▶ Delete the current value.
▶ Enter the minimum value.
▶ Click inside the Measured max. text field.
▶ Delete the current value.
▶ Enter the maximum value.
▶ Click the **OK** button.

A dialog window appears requesting to hold the sensor at the minimum position.
▶ Hold the sensor at the minimum position and click the **OK** button.

A dialog window appears requesting to hold the sensor at the maximum position.
▶ Hold the sensor at the maximum position and click the **OK** button.

The resolution will be updated with the interpolated value.

The calibration timestamp will be updated with the current date and time.

A message verifying the action is displayed in the message area.

Set recalibration timer
The recalibration timer is used with analog devices and LVDT sensors. The recalibration timer provides a notification in the Error screen when it is time to recalibrate the resolution of a device or sensor.

To set the recalibration timer:
▶ Click inside the Recal. timer text field.
▶ Delete the current value.
▶ Enter the required recalibration timer value.
▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

8.5 Referencing

Referencing is used to obtain an absolute position for 1 V_{PP} and TTL encoders.

When referencing is required the warning button will flash yellow and "Referencing has not been completed" will be displayed in the message area. A referencing status will be displayed in the Tree for encoders that require referencing.

- **!ref:** Solid - Reference mark disabled for the device.
- **!ref:** Flashing - Referencing is required, but not complete.
- **ref:** Solid - Referencing is complete.

The Setup, Data, Mastering, and Diagnostics screens are not available until referencing is complete.

Referencing is recommended, but can be skipped if an operation does not require use of the encoders with referencing enabled.

Referencing must be completed when:

- MSEsetup is opened
- A Reconnect is performed
- Reference mark setting is changed

- Signal period setting is changed
- Line count setting is changed
- Interpolation setting is changed
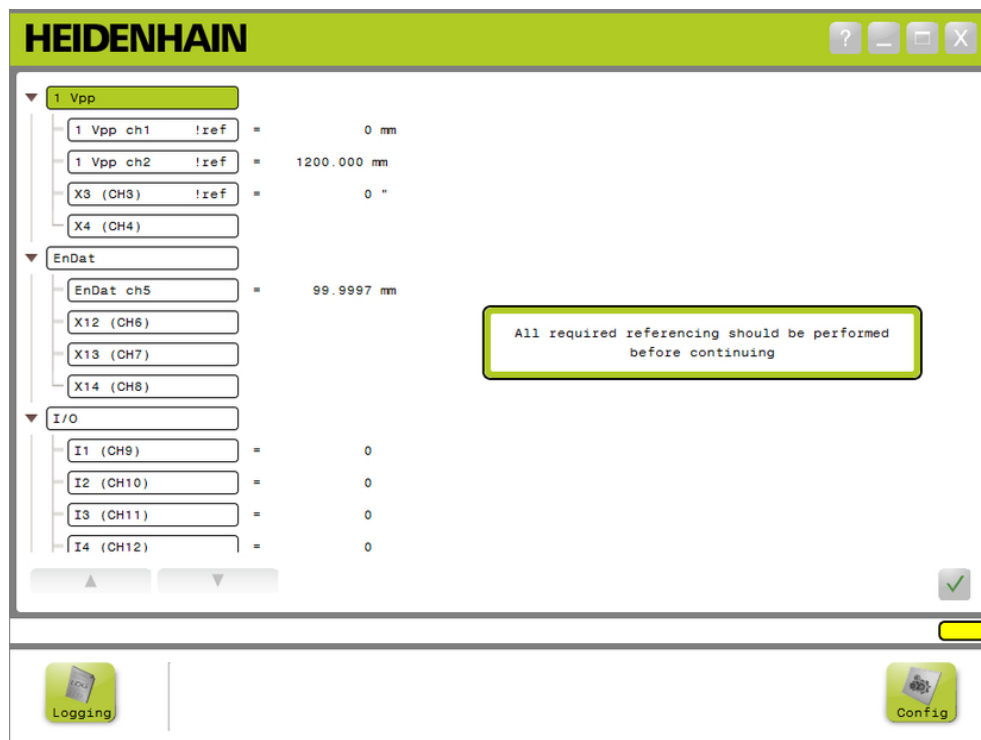
Referencing screen

Perform referencing

To perform referencing:

▶ Move an encoder to have reference mark crossings recognized.

The Tree status will change to a solid "ref" when an encoder has been successfully referenced.

▶ Repeat crossing reference marks for all encoders with referencing enabled.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Skip referencing

To skip referencing:

▶ Enable supervisor mode.

▶ Click the **Back** button.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area. The Tree status will remain a flashing "!ref" when an encoder has not been referenced.

8.6 Mastering

The mastering screen is used to apply offsets to encoder channels. Offsets allow an encoder position to be displayed relative to a specified location.

Mastering options:

- Load mastering settings
- Save mastering settings
- Disabling and enabling individual channel mastering

- Apply mastering
- Unapply mastering
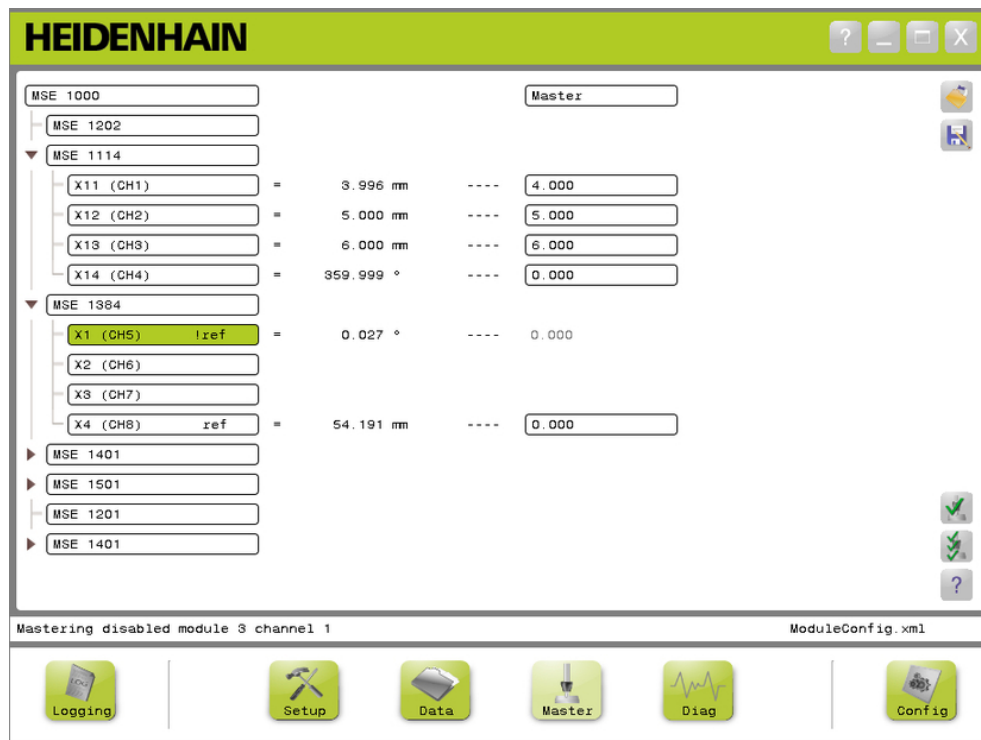
Mastering screen

Master button

To open the Mastering screen:

▶ Click the **Master** button.

The Mastering screen is displayed in the content area. A message verifying the action is displayed in the message area.

Apply offsets

To apply offsets:

▶ Double-click inside an offset value field.

The current value is highlighted.

▶ Enter the required offset value.

▶ Repeat entering offset values for all channels that require an offset.

▶ Click the **Apply all** button.

A message veryfying the action is displayed in the message area.

Unapply offsets

To unapply offsets:

▶ Click the **Unapply all** button.

A message veryfying the action is displayed in the message area.

Enable channel offset

To enable a channel offset:

▶ Select a channel from the Tree.

▶ Click the **Enable offset** button.

▶ Click the **Apply all** button.

The Enable offset button toggles to the Disable offset button. A message veryfying the action is displayed in the message area.

Disable channel offset

To disable a channel offset:

▶ Select a channel from the Tree.

▶ Click the disable channel offset button.

The Disable channel offset button toggles to the Enable channel offset button. A message veryfying the action is displayed in the message area.

Save mastering settings

To save mastering settings:

▶ Click the **Save as** button.

The File dialog window opens.

▶ If required, use the File dialog window to navigate to the desired directory.

▶ Enter a file name in the File name field.

▶ Click the **OK** button.

A message veryfying the action is displayed in the message area.

Load mastering settings

To load mastering settings:

▶ Click the **Load** button.

▶ If required, use the File dialog window to navigate to the desired directory.

▶ Select a file to load.

▶ Click the **OK** button.

A message veryfying the action is displayed in the message area.

9 Operating information

9.1 Toggle output state

The output for compressed air and I/O modules can be toggled on and off from the tree.

To toggle output:

▶ Double-click the desired channel in the tree.

The channel output state is toggled and the state is updated in the Data and Master screens.

9.2 Capturing data

The Data screen is used to capture encoder positions and input/output states. Minimum, actual, and maximum values are captured in the data screen and exported to a Microsoft Excel file by default. Data capture settings can be modified in the Configuration screen.

Further Information: "Data capture", page 65.

Minimum, actual and maximum data values are also available in the Tree by selecting their respective tab. A value of 0 will be displayed when no data has been captured.

Data screen options:

- Display and capture encoder position data
  - Minimum
  - Actual
  - Maximum
- Display and capture input and output state

- Delete data
- Export data
  - Excel spreadsheet
  - Comma separated value (CSV) file
- Save data
  - Comma separated value (CSV) file

Data screen

Data button

To open the Data screen:

▶ Click the **Data** button.

The Data screen is displayed in the content area. A message verifying the action is displayed in the message area.

Data capture
Data can be captured from MSEsetup or with a HEIDENHAIN foot switch
(ID 681041-03).

To capture data:

▶ Click the **OK** button in the Data screen.

or

▶ Press foot switch button 1 or 2. Refer to the documentation provided with the foot switch for further information.

Data values are captured in the data screen and exported to the output file based on Data capture settings.

Delete last record
Deleting the last data record is available by default when exporting to a Microsoft Excel file. If the Delete button is not visible, verify that the Output File Type is set to .xlsx in the Configuration screen.
Further Information: "Data capture", page 65.

To delete the last data record:

▶ Click the **Delete** button.

The last captured data record is deleted from the list.

Delete all records
To delete all data records:

▶ Click the **Delete all** button.

A dialog window appears to confirm the request.

▶ Click the **OK** button.

All captured data records are deleted from the list.

Reset min/max
To reset Min and Max values:

▶ Click the **Reset** button.

Minimum and maximum data capture values are reset to zero.

Hide/show Tree

The Tree can be hidden to provide additional viewing area for captured data records.

To hide the Tree:

▶ Click the **Collapse** button.

The Tree is removed from the content area. The Collapse button changes to the Expand button.

To show the Tree:

▶ Click the **Expand** button.

The Tree is displayed in the content area. The Expand button changes to the Collapse button.

Open Excel file

The Microsoft Excel file can be opened if it has been closed or Open data spreadsheet on startup has been disabled in the Configuration screen.

Further Information: "Enable/disable prompts", page 71.

This option is available by default. If the Excel button is not visible, verify that the Output File Type is set to .xlsx in the Configuration screen.

Further Information: "Data capture", page 65.

To open the Excel file:

▶ Click the **Excel** button.

The Excel data file is opened.

Save CSV file

Captured data records can be saved as a Comma Separated Value (CSV) file.

To save a CSV file:

▶ Click the **Save as** button.

The File dialog window opens.

▶ If required, use the File dialog window to navigate to the desired directory.

▶ Enter a file name in the File name field.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Tree: MIN, ACTL, MAX

To view minimum, actual, and maximum data values:

▶ Click the Tree tab for the MIN, ACTL, or MAX data value.

The selected data values are displayed for all channels in the Tree.

9.3 Logging

The Logging screen is used to show and save a log file of the actions that have occurred during an MSEsetup session. A session begins when MSEsetup is opened and ends when MSEsetup is closed. The log file is automatically saved as logfile.txt during an MSEsetup session. The logfile.txt file is overwritten each time MSEsetup is opened. Log files can be saved so they are not overwritten.

A single backup of the logfile, called logfile.txt~, is saved when MSEsetup is started. The backup logfile must be saved manually using the operating system's file system if required.

The log file has a maximum size of 10 MB. When the log file reaches 10 MB an error occurs and the file will no longer be saved.

Further Information: "Log file warnings and errors", page 160.

Logging screen options:

- Save a log file
- Open a saved log file
- Print a log file
- Delete current logging information
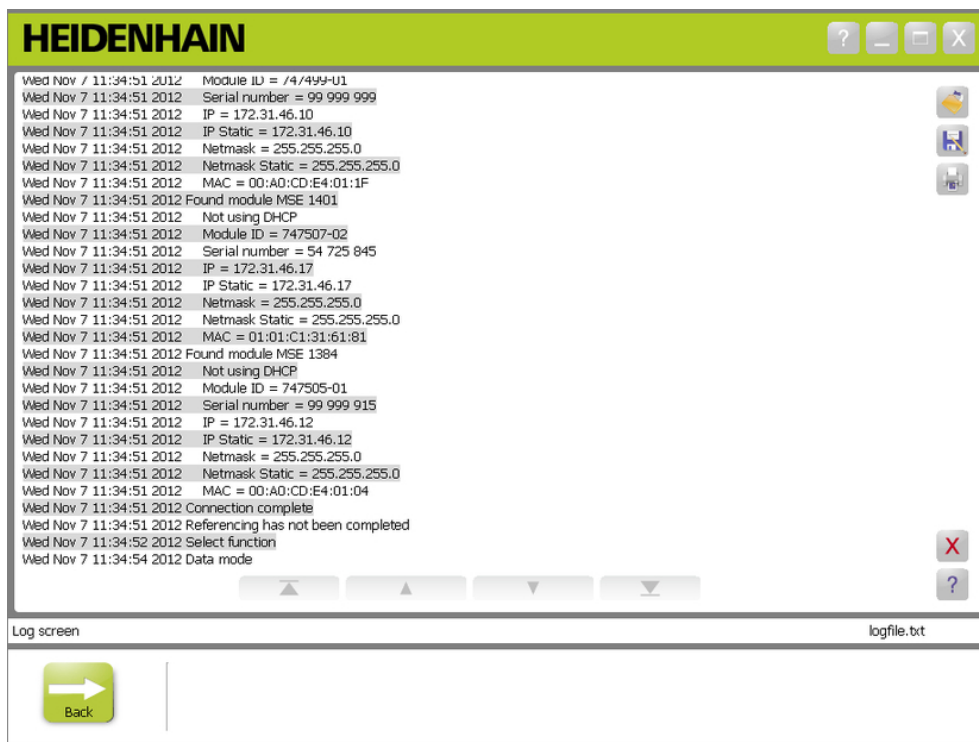
Logging screen

Logging button

To open the Logging screen:

▶ Click the **Logging** button.

The Logging screen is displayed in the content area. A message verifying the action is displayed in the message area.

Save log file

The current log file can be saved with a new name so that it does not get overwritten the next time MSEsetup is opened.

To save the log file:

▶ Click the **Save as** button.

▶ The File dialog window opens.

▶ If required, use the File dialog window to navigate to the desired directory.

▶ Enter a file name in the File name field.

▶ Click the **OK** button.

A message verifying the action is displayed in the message area.

Open log file

To open a log file:

▶ Click the **Open** button.

The File dialog window opens.

▶ Use the File dialog window controls to select a log file.

▶ Click the **OK** button.

The selected log file is displayed in the Content area.

Print log file

To print the log file:

▶ Click the **Print** button.

A dialog window opens to verify the request.

▶ Click the **OK** button.

The log file is sent to the workstation default printer.

Delete log file

To delete the log file:

▶ Click the **Delete** button.

A dialog window opens to verify the request.

▶ Click the **OK** button.

The current log information is deleted.

9.3.1 Service log

The Service log is used for logging MSE 1000 module networking information collected during a broadcast when the modules are first powered on. Service log information is useful if a module is set to an unknown IP address or netmask.

The service log file has a maximum size of 1 MB.

Service log information:

- Port
- IP address
- Static IP address

- Netmask
- Static netmask
- MAC address

- Serial number

View service log

To view the service log:

▶ Click the **Open** button.

The File dialog window opens.

▶ Select the service_logfile.txt file.

▶ Click the **OK** button.

The service log file is displayed in the Content area.

9.4 Asynchronous message thread

MSEsetup has a thread that runs in the background and binds a UDP socket to the asynchronous port. The asynchronous default port is 27300 and can be changed in the Networking screen. This thread is used to accept asynchronous messages from the MSE 1000 modules as well as from other client applications that want to perform functions through MSEsetup.

Modules send broadcasts specifying their network information as well as referencing complete, foot switch triggers, warnings, and errors.

The MSEvba.xlsm file is an Excel spreadsheet that is installed with MSEsetup for demonstrating how to send asynchronous commands to MSEsetup using Visual Basic for Applications (VBA).

MSEvba.xlsm location: C:\Program Files\HEIDENHAIN\MSEsetup\Excel

9.4.1 Asynchronous commands

Any application that can utilize sockets can interface with MSEsetup.

Command structure format:

```
STRUCT ASYNCCMDSTRUCT
{
 UNSIGNED CHAR UDPCODE;
 UNSIGNED CHAR REQUEST;
 UNSIGNED CHAR MODULENUM;
 UNSIGNED CHAR CHANNELNUM;
 UNSIGNED CHAR VALUE;
};
```

The udpCode is always 222. This is a special command informing the Asynchronous thread the command is not from the modules.

Available requests:

Request	Parameters
Connect	A value of 150 must be put in the UDP packet.
	The moduleNum is not used.
	The channelNum is not used.
	The value is not used.
	Responds by sending the text "connect" back.

Request	Parameters
Toggle Output	A value of 151 must be put in the UDP packet.
	A module number must be put in the UDP packet.
	The required output number must be put in the UDP packet (1-4).
	The value is not used.
	Toggles the desired output.
	No response is sent back.
Set Output	A value of 152 must be put in the UDP packet.
	A module number must be put in the UDP packet.
	The required output number must be put in the UDP packet (1-4).
	The value must be 0 for off or 1 for on.
	Sets the output to the desired value.
	No response is sent back.
Set Latch	A value of 153 must be put in the UDP packet.
	The moduleNum is not used.
	The channelNum is not used.
	The value is used to determine which latch line to trigger (1-5).
	A latch command is sent to the modules causing the data to be updated in the Data screen and the Mse1000Data.xlsx Excel spreadsheet.
	No response is sent back.

9.4.2   Visual Basic for Applications (VBA)

The MSEvba.xlsm spreadsheet uses the mswinsck.ocx, dblist32.ocx, and richtx32.ocx ActiveX control. These controls are installed with MSEsetup.

The Windows registry entry is modified in order to utilize the winsock ActiveX control.

HKLM\SOFTWARE\Microsoft\Internet Explorer\ActiveX Compatibility\{248DD896-BB45-11CF-9ABC-0080C7E7B78D}

To open the MSEvba.xlsm spreadsheet:

▶ Navigate to C:\Program Files\HEIDENHAIN\MSEsetup\Excel.

▶ Double click the MSEvba.xlsm file.

A dialog window appears requesting verification to initialize ActiveX controls.

▶ Click **OK**.

The spreadsheet will always make sure the ActiveX compatibility is set correctly since the registry entry is overwritten when Microsoft updates are performed.

The spreadsheet file should be copied or saved into the user's directory in order to create additional functionality.

To access the VBA procedures and winsock usage:

▶ Enable "Show Developer tab in the Ribbon". Refer to the documentation provided with the software for instructions.

▶ Click on the "Developer" tab.

▶ Click on "Visual Basic".

Example: Setting a relay output
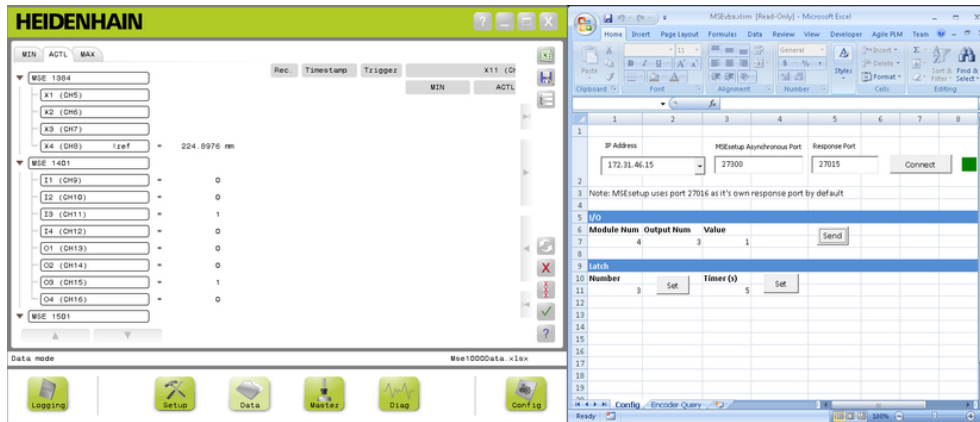
Relay output example

The following example demonstrates the relay output on module 3 being set high by the MSEvba.xlsm file.

▶ Select the IP address of the workstation from the IP address drop-down menu.
▶ Verify that MSEsetup Asynchronous Port is set to 27300.
▶ Enter the Response Port if required.

The response port only needs to be changed if another application is using the same port on the selected IP address.

▶ Click **Connect**.

The I/O section of the spreadsheet is used to select the module number, relay output and output value to set.

▶ Enter the number of the I/O module into the Module Num field.
▶ Enter the relay output pin number into the Output Num field.
▶ Enter a value of "1" for the relay output value into the Value field.
▶ Click **Send**.

The spreadsheet sends a "Set Output" request to the MSEsetup asynchronous thread and the relay output is set High (1).

10   Installation and commissioning examples

Each MSE 1000 system is unique, but the installation and commissioning of most systems is similiar.

- Install the MSE 1000 system
- Configure the MSEsetup software
- Configure the network communication settings
- Setup the modules
- Setup the encoders

10.1   Example using DHCP IP address assignment

The following information provides an example for how to install and commission an MSE 1000 system with three modules and two encoders using DHCP IP address assignment.

MSE 1000 modules with encoders:

- MSE 1201 (ID 747501-01) AC 120 V power supply module
- MSE 1184 (ID 747500-01) 1 V_{PP} base module with one ST 128x length gauge
- MSE 1314 (ID 747503-01) 4-channel EnDat module with one AT 1217 length gauge

10.1.1   Mount the modules

Mount power supply module

▶ Mount the MSE 1201 (ID 747501-01) power supply module, see "Mounting a module", page 34.

Mount base module

▶ Mount the MSE 1184 (ID 747500-01) 1 V_{PP} base module, see "Mounting a module", page 34.

Connect power supply and base module

▶ Connect the power supply module and the base module, see "Connecting modules", page 35.

Mount EnDat module

▶ Mount the MSE 1314 (ID 747503-01) 4-channel EnDat module, see "Mounting a module", page 34.

Connect base and EnDat module

▶ Connect the base module and the 4-channel EnDat module, see "Connecting modules", page 35.

10.1.2 Install the end covers

Install end covers
▶ Install the left end cover on the left side of the power supply module, see "Installing end covers", page 36.
▶ Install the right end cover on the right side of the 4-channel EnDat module, see "Installing end covers", page 36.

10.1.3 Connect the power cord

Connect the power cord
▶ Connect the power cord to the MSE 1201 (ID 747501-01) power cord connector **4**, see "Connecting a power cord", page 42.

10.1.4 Connect the networking cables

Connect the base module to the router
▶ Connect one end of an RJ-45 network cable to the RJ-45 connection **15** on the MSE 1184 (ID 747500-01) 1 V_{PP} base module, see "Connecting a network cable", page 43.
▶ Connect the other end of this network cable to one of the LAN ports on the DHCP router. Refer to the documentation provided with the router for connection location.

Connect to the workstation to the router
▶ Connect one end of a second RJ-45 network cable to the workstation NIC. Refer to the documentation provided with the workstation PC for instructions.
▶ Connect the other end of this network cable to one of the LAN ports on the DHCP router. Refer to the documentation provided with the router for connection location.

10.1.5   Connect the encoders

Connect the 1 V$_{PP}$ encoder
▶ Connect the 1 V$_{PP}$ encoder to the MSE 1184 (ID 747500-01) X1 connector **17**, see "Connecting a 1 VPP encoder", page 44.

Connect the EnDat encoder
▶ Connect the EnDat encoder to the MSE 1314 (ID 747503-01) X11 connector **16**, see "Connecting an EnDat encoder", page 43.

10.1.6   Secure the cables

Install cable mounting hardware
▶ Install the cable mounting hardware provided with each module, see "Installing cable mounting hardware", page 36.

Secure cables
▶ Secure all cables to the cable mounting hardware using the supplied cable tie's.

10.1.7   Configure the DHCP router

Configure the DHCP router
▶ Connect to the router through the router utility. This is usually a web browser. Refer to the documentation provided with the router for instructions.
▶ Set the IP address of the router to 172.31.46.3.
▶ Set the netmask to 255.255.255.0.
▶ Set the address range for 172.31.46.4 to 172.31.46.255.
▶ Set the lease time to Forever.
▶ Disable SNTP.

10.1.8   Install the software

Install MSEsetup
▶ Download and install the MSEsetup application software, see "Installing MSEsetup", page 49.

10.1.9   Open the software

Open MSEsetup
▶ Double-click the MSEsetup desktop icon to open MSEsetup, see "Basic functions", page 61.

10.1.10 Power-up the modules

Power-up
▶ Press the On (supply) side of the power switch to power-up the system, see "Initial power-up", page 48.

10.1.11 Configure the network with DHCP

The power LED's on each module light solid green. Network LED's initially flash green five times per second when waiting for DHCP to assign an IP address.
▶ Wait for the Network LED to flash green twice per second on all modules.

Open the Configuration screen
▶ Click the **Config** button in MSEsetup.

Enable Supervisor mode
▶ Click the **Supervisor mode** button.
▶ Enter "95148" into the Password field.

Open the Connect screen
▶ Click the **Connect** button.

Perform a Broadcast
▶ Select the 255.255.255.0 netmask from the Broadcast netmask drop-down list.
▶ Click the **Broadcast** button.
▶ Click the **Cancel** button to proceed without overwriting the settings.

A message verifying that broadcasting is finished is displayed in the Connect screen message area.

Switch to Static addressing
▶ Click the **OK** button in the dialog box when asked to switch to static addressing.

10.1.12 Setup the 1 V_{PP} channel

Open the Setup screen
▶ From the Connect screen, click the **Back** button twice.
▶ Click the **Setup** button.

Select the 1 V_{PP} Channel
▶ Click on **X1 (CH1)** under MSE 1184 in the Tree.
▶ Click the **Channel** tab.

Assign the length gauge to the 1 V_{PP} channel
▶ Click and drag the Length Gauge icon to the green square labeled X1. The green square appears when the length gauge icon is clicked and dragged.
▶ Click the **OK** button.

Further Information: "Channel setup", page 97 for additional channel settings options.

10.1.13 Setup the 1 V$_{PP}$ encoder

Open the device tab
▶ Click the **Device** tab.

Select the reference mark setting
▶ Click the **Reference mark** drop-down arrow.
▶ Select **Single**.

Select the Signal period setting
▶ Click the **Signal period (um)** drop-down arrow.
▶ Select **20**.
▶ Click the **OK** button.

Further Information: "Device setup", page 103 for additional device settings.

10.1.14 Setup the EnDat channel

Select the EnDat Channel
▶ Click on **X11 (CH5)** under MSE 1314 in the Tree.
▶ Click the **Channel** tab.

EnDat encoder types are automatically recognized when an EnDat encoder is connected to a module channel.

Further Information: "Channel setup", page 97 for additional channel settings options.

10.1.15 Setup the EnDat encoder

Open the Device tab
▶ Click the **Device** tab.

Turn Error monitoring off
Disabling error monitoring is useful for increasing communication speed with EnDat v2.2 encoders.
▶ Click the **Error monitoring** drop-down arrow.
▶ Select **Off**.
▶ Click the **OK** button.

Further Information: "Device setup", page 103 for additional device settings.

10.2   Example using manual IP address assignment

The following information provides an example for how to install and commission an MSE 1000 system with three modules and two encoders using manual IP address assignment.

MSE 1000 modules with encoders:

- MSE 1201 (ID 747501-01) AC 120 V power supply module
- MSE 1184 (ID 747500-01) 1 V_{PP} base module with one ST 128x length gauge
- MSE 1314 (ID 747503-01) 4-channel EnDat module with one AT1217 length gauge

10.2.1   Mount the power supply and base modules

Mount power supply module
▶ Mount the MSE 1201 (ID 747501-01) power supply module, see "Mounting a module", page 34.

Mount base module
▶ Mount the MSE 1184 (ID 747500-01) 1 V_{PP} base module, see "Mounting a module", page 34.

Connect power supply and base module
▶ Connect the power supply module and the base module, see "Connecting modules", page 35.

10.2.2   Connect the power cord

Connect the power cord
▶ Connect the power cord to the MSE 1201 (ID 747501-01) power cord connector **4**, see "Connecting a power cord", page 42.

10.2.3   Connect the networking cable

A crossover cable may be required when connecting the workstation directly to the base module. In this example a crossover cable is being used. Refer to the documentation provided with the NIC to verify if a crossover cable is required.

Connect the base module to the workstation
▶ Connect one end of an RJ-45 network crossover cable to the RJ-45 connection **15** on the MSE 1184 (ID 747500-01) 1 V_{PP} base module, see "Connecting a network cable", page 43.
▶ Connect the other end of the network crossover cable to the workstation NIC. Refer to the documentation provided with the workstation PC for instructions.

10.2.4 Install the software

Install MSEsetup
▶ Download and install the MSEsetup application software, see "Installing MSEsetup", page 49.

10.2.5 Open the software

Open MSEsetup
▶ Double-click the MSEsetup desktop icon to open MSEsetup, see "Basic functions", page 61.

10.2.6 Configure the workstation NIC

Configure the workstation IP
▶ Configure the workstation NIC IP address to 172.31.46.3 in the workstation PC networking settings. Refer to the documentation provided with the PC or NIC for configuration instructions.

Configure the workstation Subnet mask
▶ Configure the workstation Subnet mask to 255.255.255.0 in the workstation PC networking settings. Refer to the documentation provided with the PC or NIC for configuration instructions.

10.2.7 Power-up the modules

Power-up
▶ Press the On (supply) side of the power switch to power-up the system, see "Initial power-up", page 48.

10.2.8 Configure the workstation IP, power supply, and base module network communication settings

The power LED's on each module light solid green. Network LED's initially flash green five times per second when waiting for DHCP to assign an IP address. After a 45 second timeout the modules will stop waiting for DHCP to assign an IP address and the Network LED's on each module will flash green twice per second.

▶ Wait for the Network LED to flash green twice per second on all modules.

Open the Configuration screen
▶ Click the **Config** button.

Enable Supervisor mode
▶ Click the **Supervisor mode** button.
▶ Enter "95148" into the Password field.

Open the Connect screen
▶ Click the **Connect** button.

Configure the Workstation IP
▶ Select **172.31.46.3** from the Workstation IP drop-down list.
▶ Select **255.255.255.0** from the Netmask drop-down list.
Further Information: "Workstation IP", page 79.

Perform a Broadcast
▶ Click the **Broadcast** button.

A dialog box appears asking to configure the modules using a backup file.

▶ Click the **Cancel** button.

A dialog box appears asking to configure the modules to use static addressing.

▶ Click the **OK** button.

A dialog box appears verifying the modules have been set to use static addressing and requesting to cycle power.

Cycle the power
▶ Turn the power off, wait 20 seconds then turn the power on.
▶ Wait for the Network LED's to flash twice per second on all modules.
▶ Click the **OK** button in the dialog box.
▶ Click the **Cancel** button when requested to overwrite the settings from a backup file.

Configure the power supply module
▶ Select the power supply module from the Individual Module IP drop-down list.
▶ Click inside the enabled Set Static text field and enter "4" (172.31.46.4).
▶ Click the **Set Static** button.

MSEsetup sets the static IP address and performs a reconnect to the modules.

Configure the base module
▶ Select the base module from the Individual Module IP drop-down list.
▶ Click inside the enabled Set Static text field and enter "5" (172.31.46.5).
▶ Click the **Set Static** button.

MSEsetup sets the static IP address and performs a reconnect to the modules.

Set the module chain to use Static addressing
▶ Click the **Use Static Addressing** button.

A dialog box confirms that all modules have been set to static addressing.

▶ Cycle power for the entire module chain by turning the power off and then back on.
▶ Wait for the Network LED to flash twice per second on all modules.
▶ Click the **OK** button in the dialog box.

MSEsetup performs a broadcast. A dialog box confirms the number of modules found.

▶ Click the **OK** button in the dialog box to overwrite the configurable module settings.

10.2.9 Power-off the modules

Power-off
▶ Press the Off (supply) side of the power switch to power-off the system.

10.2.10 Mount the EnDat module

Mount EnDat module
▶ Mount the MSE 1314 (ID 747503-01) 4-channel EnDat module, see "Mounting a module", page 34.

Connect base and EnDat module
▶ Connect the base module and the 4-channel EnDat module, see "Connecting modules", page 35.

10.2.11 Install the end covers

Install end covers
▶ Install the left end cover on the left side of the power supply module, see "Installing end covers", page 36.
▶ Install the right end cover on the right side of the 4-channel EnDat module, see "Installing end covers", page 36.

10.2.12 Connect the encoders

Connect the 1 V_{PP} encoder
▶ Connect the 1 V_{PP} encoder to the MSE 1184 (ID 747500-01) X1 connector **17**, see "Connecting a 1 VPP encoder", page 44.

Connect the EnDat encoder
▶ Connect the EnDat encoder to the MSE 1314 (ID 747503-01) X11 connector **16**, see "Connecting an EnDat encoder", page 43.

10.2.13 Secure the cables

Install cable mounting hardware
▶ Install the cable mounting hardware provided with each module, see "Installing cable mounting hardware", page 36.

Secure cables
▶ Secure all cables to the cable mounting hardware using the supplied cable tie's.

10.2.14 Power-up the modules

Power-up
▶ Press the On (supply) side of the power switch to power-up the system, see "Initial power-up", page 48.

10.2.15 Configure the EnDat module network communication settings

The power LED's on each module light solid green. Network LED's flash green twice per second.

▶ Wait for the Network LED's to flash green twice per second on all modules.

Perform a Broadcast
▶ Click the **Broadcast** button.

A dialog box appears asking to configure the EnDat module to use static addressing.

Configure the EnDat module for static addressing
▶ Click the **OK** button.

A dialog box confirms the EnDat module has been configured to use static addressing.

Cycle the power
▶ Turn the power off, wait 20 seconds then turn the power on.
▶ Wait for the Network LED's to flash twice per second on all modules.
▶ Click the **OK** button in the dialog box.
▶ Click the **OK** button to overwrite the settings.

Configure the EnDat module IP address
▶ Select the EnDat module from the Individual Module IP drop-down list.
▶ Click inside the enabled Set Static text field and enter "6" (172.31.46.6).
▶ Click the **Set Static** button.

MSEsetup sets the static IP address and performs a reconnect to the modules.

10.2.16 Setup the 1 V$_{PP}$ channel

Open the Setup screen
▶ From the Connect screen, click the **Back** button twice.
▶ Click the **Setup** button.

Select the 1 V$_{PP}$ Channel
▶ Click on **X1 (CH1)** under MSE 1184 in the Tree.
▶ Click the **Channel** tab.

Assign the length gauge to the 1 V$_{PP}$ channel
▶ Click and drag the Length Gauge icon to the green square labeled X1. The green square appears when the length gauge icon is clicked and dragged.
▶ Click the **OK** button.

Further Information: "Channel setup", page 97 for additional channel settings options.

10.2.17 Setup the 1 V$_{PP}$ encoder

Open the device tab
▶ Click the **Device** tab.

Select the reference mark setting
▶ Click the **Reference mark** drop-down arrow.
▶ Select **Single**.

Select the Signal period setting
▶ Click the **Signal period (um)** drop-down arrow.
▶ Select **20**.
▶ Click the **OK** button.

Further Information: "Device setup", page 103 for additional device settings.

10.2.18 Setup the EnDat channel

Select the EnDat Channel
▶ Click on **X11 (CH5)** under MSE 1314 in the Tree.
▶ Click the **Channel** tab.

EnDat encoder types are automatically recognized when an EnDat encoder is connected to a module channel.

Further Information: "Channel setup", page 97 for additional channel settings options.

10.2.19 Setup the EnDat encoder

Open the Device tab
▶ Click the **Device** tab.

Turn Error monitoring off
Disabling error monitoring is useful for increasing communication speed with EnDat v2.2 encoders.
▶ Click the **Error monitoring** drop-down arrow.
▶ Select **Off**.
▶ Click the **OK** button.

Further Information: "Device setup", page 103 for additional device settings.

11 Maintenance

⚠ WARNING

A risk of personal injury or death exists if regular inspection and maintenance tasks are not completed.

Follow the recommended inspection and maintenance schedule to keep the product in a safe operating condition.

The following inspection and maintenance procedures are required to ensure the product is maintained in a safe operating state.

Type	Part	Interval	Possible failure	Follow up
Visual inspection	Power cord	Annual	Damaged insulation, visible or damaged wires	Replace power cord
Visual inspection	Symbols and labels on product	Annual	Labels and safety symbols not readable or not present on the product. Refer to "Safety symbols", page 31.	Contact a HEIDENHAIN service technician
Visual inspection	Product housing and interface connections	Annual	Damage or wear that can affect the functionality and safety of the product	Contact a HEIDENHAIN service technician
Electrical Test	Protective ground connection	Annual	Interrupted or bad connection	Replace power cord or contact a HEIDENHAIN service technician

11.1 Cleaning

> ⚠ **WARNING**
>
> While cleaning it is possible to conduct electricity from hazardous live parts if liquid enters the product.
>
> To avoid the hazard, always power off the product, disconnect the power cable and never use a cloth that is dripping or saturated with water.

> *NOTICE*
>
> Never use abrasive cleaners, strong detergents or solvents to avoid damage to the product.

Cleaning

To clean:

▶ Verify power is removed from all power supply modules in the module chain
▶ Wipe exterior surfaces with a cloth dampened with water and a mild household detergent

11.2 Replacing a fuse

> ⚠ **WARNING**
>
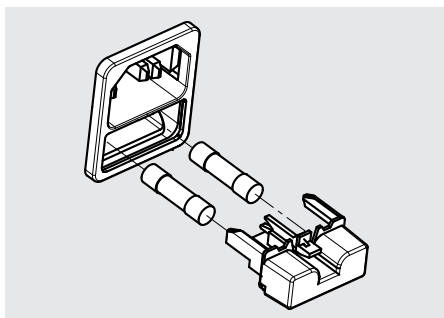> Risk of electrical shock When replacing a fuse it is possible to touch hazardous live parts.
>
> To avoid the hazard, always power off the unit and disconnect the power cable.

> *NOTICE*
>
> Use only replacement fuses meeting rated specifications to avoid damage to the product.

MSE 1201 (ID 747501-01)

To replace a fuse, MSE 1201 (ID 747501-01):

▶ Verify that the power switch is in the off position

▶ Disconnect the power cable from the source of power

▶ Press the fuse holder release until the retaining mechanism is disengaged

▶ Remove the fuse holder and replace the fuse

▶ Re-insert the fuse holder and gently press in until the retaining mechanism is engaged

MSE 1201 (ID 747501-02), MSE 1202 (ID 747502-0x)
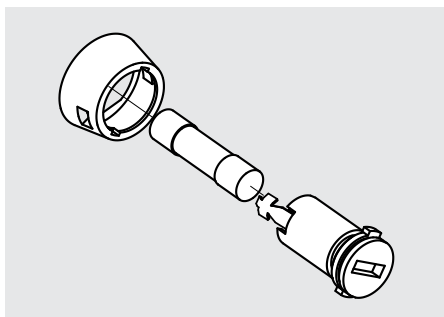
To replace a fuse, MSE 1201 (ID 747501-02), MSE 1202 (ID 747502-01):

▶ Verify power is removed from the module

▶ Insert a flat-edge screwdriver into the slot on the fuse holder and turn counterclockwise to disengage the fuse holder

▶ Remove the fuse holder and replace the fuse

▶ Re-insert the fuse holder and turn clockwise with flat-edge screwdriver until re-engaged

12 Troubleshooting

12.1 Diagnostics

The Diagnostics screen is used to display diagnostic data specific to the selected module or device.

Diagnostics information:

- Module
- Device

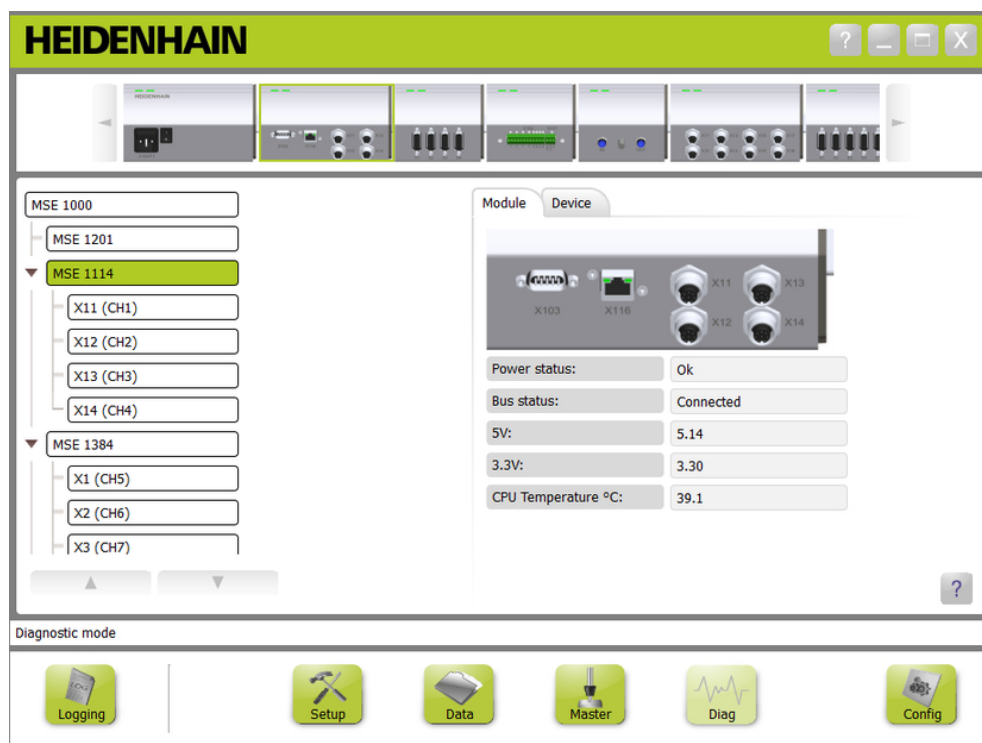Diagnostics screen

Diag button

To open the Diagnostics screen:

▶ Click the **Diag** button.

The Diagnostics screen is displayed in the content area. A message verifying the action is displayed in the message area.

12.1.1   Module diagnostics

The Module tab displays diagnostics data specific to the selected module.

The Module label text color in Tree will turn yellow when a warning occurs and red when an error occurs. Warnings and errors must be cleared for the Module label to be reset to black text. If a warning or error still exists the Module label text color will return to yellow or red.

Module tab diagnostics:

- Power status
- Bus status
- 5V

- 3.3V
- 24V
- Current

- CPU temperature

Power supply module diagnostics screen

Non-power supply module diagnostics screen

Module diagnostics

Power status	Displays "Ok" if the selected module is connected.
	Voltage or temperature warnings and errors will be displayed in the Tree and Error screen.
Bus status	Displays the network bus connection status of the selected module.
	Communication warnings will be displayed in the Error screen.
5V	Displays the voltage reading for the 5 V supply of the selected module.
3.3V	Displays the voltage reading for the 3.3 V supply of the selected module.
24V	Displays the voltage reading for the 24 V supply of the selected module. Displayed for power supply modules only.
Current	Displays the electrical current being drawn from the selected power supply module by non power supply modules and connected devices.
CPU temperature	Displays the temperature of the microcontroller CPU inside the selected module. CPU temperature is available only when supervisor mode is enabled.

12.1.2 Device diagnostics

The Device tab displays diagnostics data specific to the device connected to the selected channel.

The channel value text color in Tree will turn yellow when a warning occurs and red when an error occurs. Warnings and errors must be cleared for the channel value to be reset to black text. If a warning or error still exists the channel value text color will return to yellow or red.

Device diagnostics are available for the following devices:
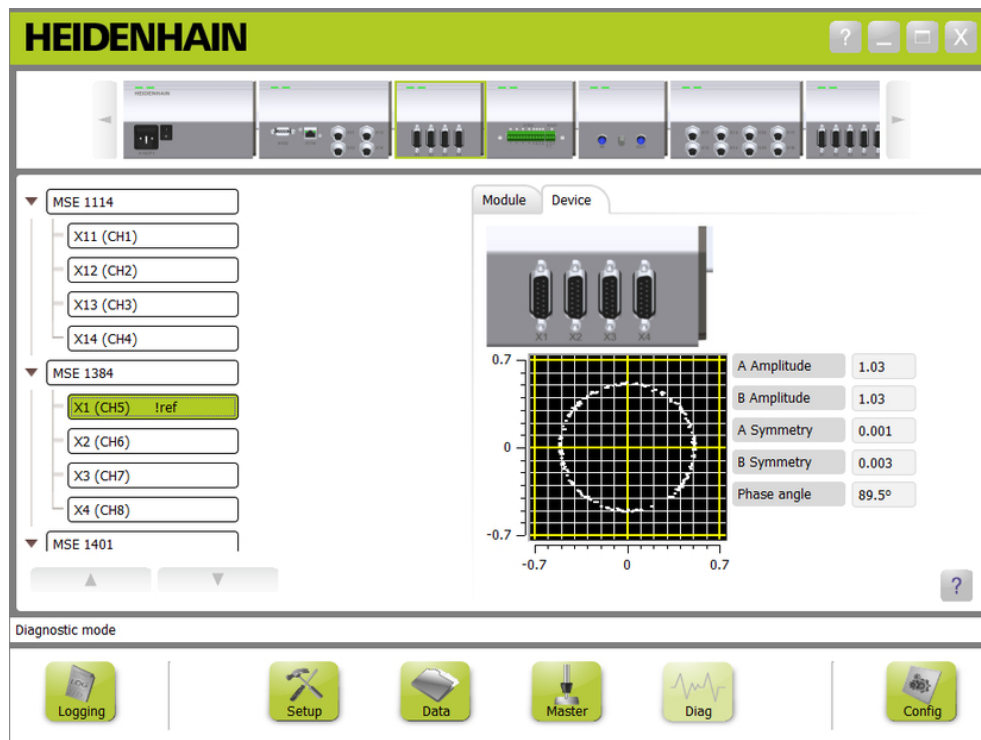
- 1 V_{PP}
- EnDat
- LVDT
- Analog

1 V_{PP} diagnostics

1 V_{PP} diagnostics are used to verify that a 1 V_{PP} encoder is operating properly.

1 V_{PP} device diagnostics:

- Lissajous figure
- Signal B Amplitude
- Signal B Symmetry
- Signal A Amplitude
- Signal A Symmetry
- Phase Angle

1 V_{PP} diagnostics screen

1 V$_{PP}$ diagnostics

Lissajous figure	Displays the signal A and B amplitude readings from the encoder as a Lissajous figure. The encoder must be moved for the graph to be visible.
	The graph will display a circle, centered in the graph when an encoder is operating properly. Differences in the shape or position of the circle may indicate signal quality or encoder alignment problems. The size of the circle is based on the signal A and B amplitude readings. A circle smaller or larger than 1 V may indicate a minimum or maximum amplitude problem.
Signal A Amplitude	Displays the signal A amplitude reading from the encoder.
Signal B Amplitude	Displays the signal B amplitude reading from the encoder.
Signal A Symmetry	Displays the signal A symmetry reading from the encoder.
Signal B Symmetry	Displays the signal B symmetry reading from the encoder.
Phase Angle	Displays the phase angle reading from the encoder.

EnDat diagnostics
EnDat diagnostics are used to verify that an EnDat encoder is operating properly.

EnDat device diagnostics:

- Warnings
- Errors
- Function reserves

Warnings and errors
The EnDat warnings and errors screen is used to display any warnings or errors that may be present for the encoder connected to the selected channel.

The current status of a warning or error is displayed in a color coded square next to the name of the warning or error.

Color codes:

Green: No warning or error exists for the connected encoder.

Yellow: A warning exists for the connected encoder.

Red: An error exists for the connected encoder.

Grey: Warning or error is not supported by the connected encoder.

A Warnings indicates that certain tolerances of the encoder were reached or exceeded, but the position value is not incorrect. An Error becomes active if there is a malfunction in the encoder that is presumably causing incorrect position values.

Refer to the documentation provided with the encoder for additional information on EnDat warnings and errors.

EnDat warnings and errors:

- Warnings
  - Frequency Exceeded
  - Temperature Exceeded
  - Light Control Reserve
  - Battery Charge Low
  - Traverse Reference Point

- Errors
  - Light Unit
  - Signal Amplitude
  - Position Error
  - Overvoltage
  - Undervoltage
  - Overcurrent
  - Battery Failure

EnDat warnings and errors screen

Function reserves

The Function Reserves screen is used to display absolute track, incremental track and position value formation bar diagrams. The result is displayed in %. A drag indicator (square above the bar display) marks the minimum.

Function reserves ranges:

Green range: The output signal is within the specifications.

Yellow range: The output signal is outside the specifications, but no counting or calculation errors are to be expected. No alarms are generated, warnings may occur.
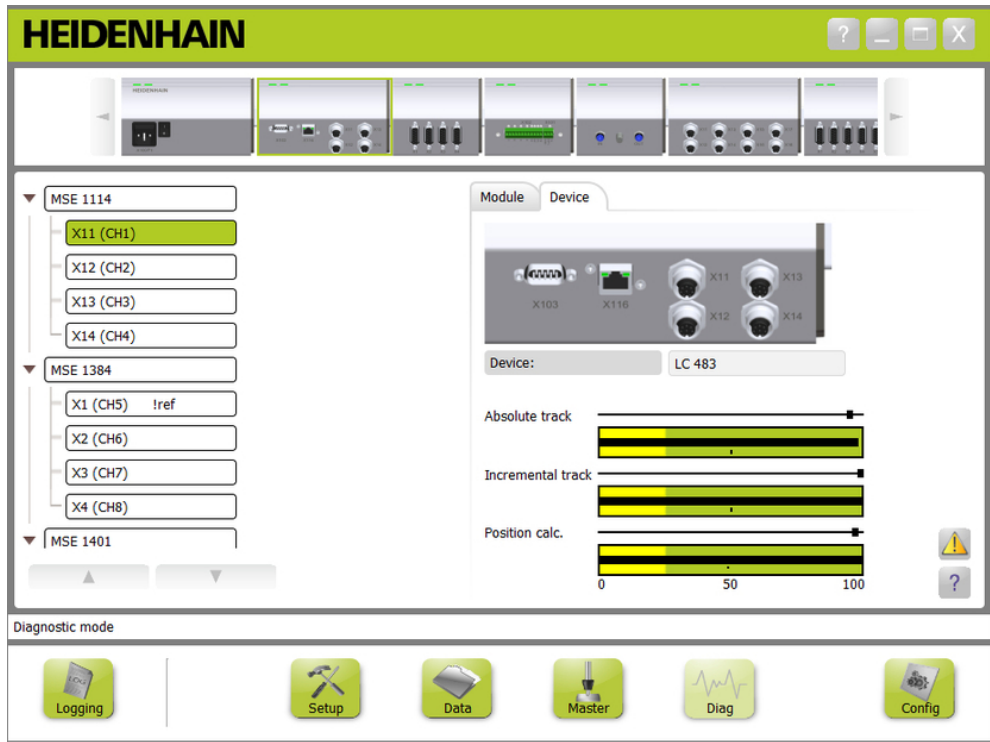

NOTICE

The yellow range indicates service or maintenance recommended.

Refer to the documentation provided with the encoder for additional information on EnDat function reserves.

Function reserves:

- Absolute track
- Incremental track
- Positions value

Function reserves screen

Open Function reserves screen

To open the Function reserves screen:

▶ Click the **Function reserves** button.

The Function reserves screen is displayed in the content area.

LVDT sensor diagnostics

LVDT sensor diagnostics are used to monitor the LVDT sensor output voltage.

The LVDT sensor diagnostics screen displays a graphical representation of how much of the total positional range of the electronics is being utilized. The yellow areas of the graphic signify the outermost 20% of the total usable range. The positional accuracy and stability of the sensor is at its best when closest to the center of the graphic. The center of the LVDT sensor is also known as the NULL position.

LVDT sensor diagnostics:
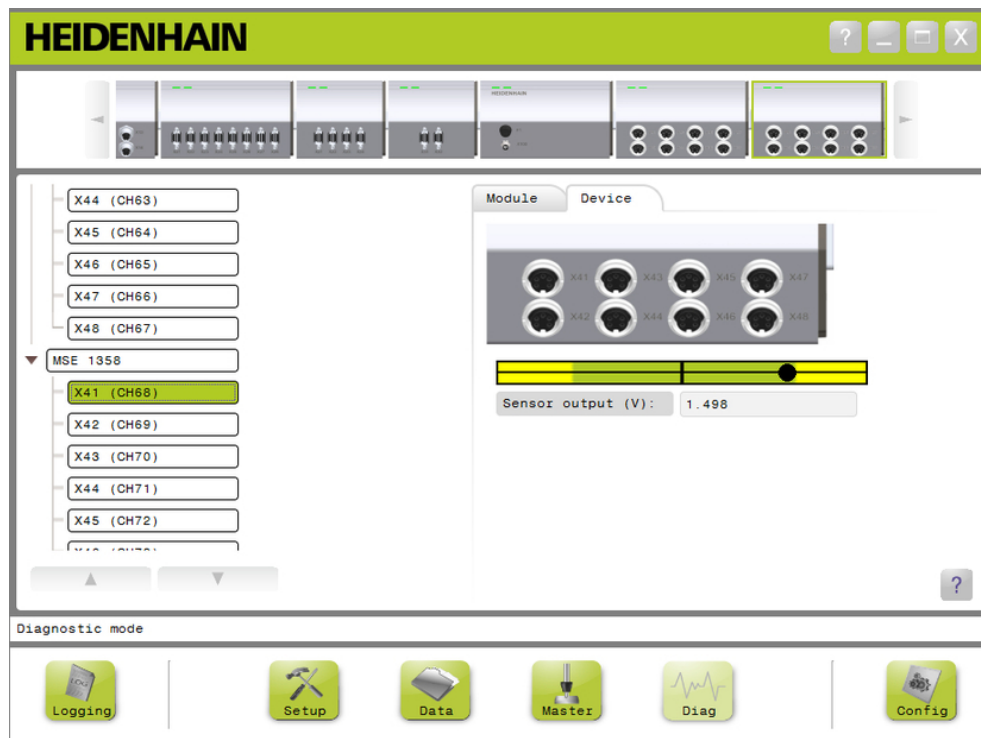
■ Sensor output

LVDT sensor diagnostics screen

LVDT sensor diagnostics

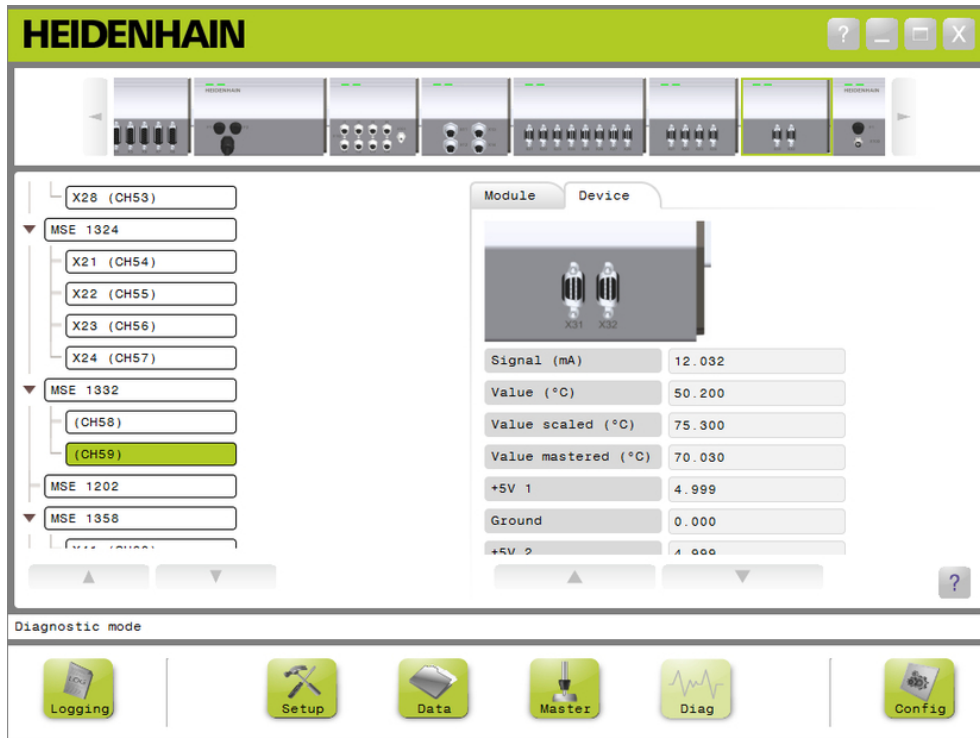Sensor output (V)   Displays the voltage output of the sensor.

Analog diagnostics
Analog diagnostics are used to monitor the analog value from an analog device and show the conversions to units, the effect of scaling, the effect of mastering, and the electrical value used by the device.

Analog diagnostics:

- Signal
- Value
- Value scaled
- Value mastered
- +5V 1
- Ground
- +5V 2
- Vref

Analog diagnostics screen

Analog diagnostics	
Signal	Displays the raw value in volts or mA.
Value	Displays the raw value multiplied by the calibrated resolution.
Value scaled	Displays the value multiplied by the scale factor.
Value mastered	Displays the scaled value with the master offset.
+5V 1	Displays the 5V source.
Ground	Displays the ground.
+5V 2	Displays a second readout of the 5V source.
Vref	Displays the reference voltage.

12.2   Error screen

The Error screen is used for viewing and clearing warnings and errors. This screen is only available when there is a warning or error present and the Warning or Error button is flashing in the message area. All warnings and errors are displayed in the message area and saved in the log file.

Error screen options:

- View warnings and errors
- Clear warnings and errors
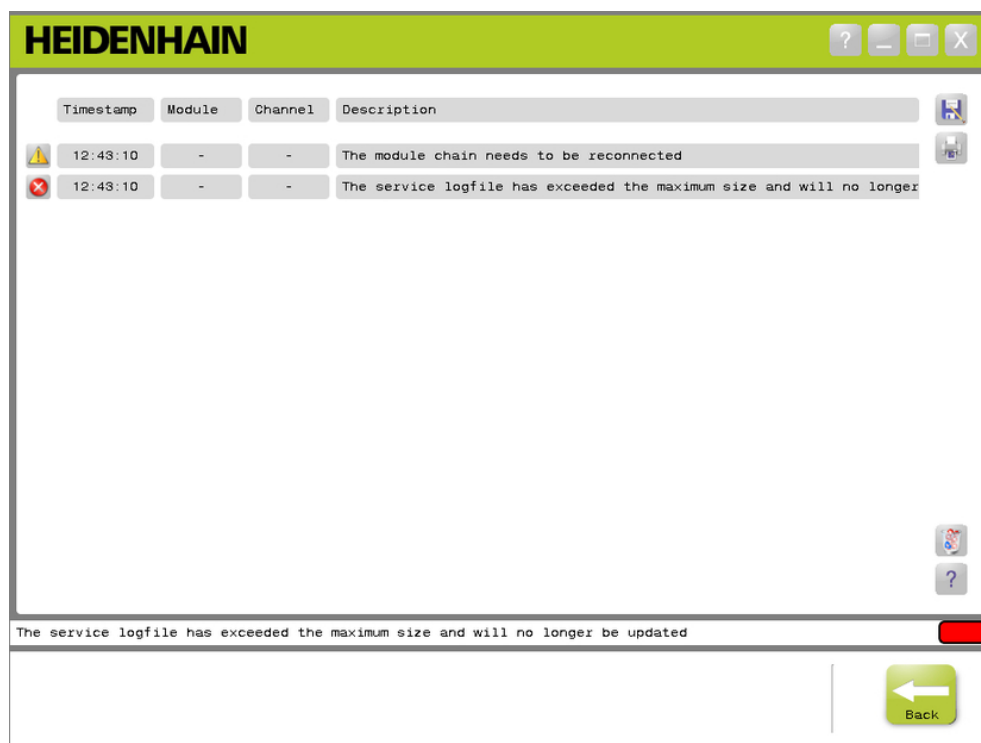
Error screen

Warning button

Error button

To open the error screen:

▶ Click the flashing **Warning** or **Error** button located in the message area.

The Error screen is displayed in the content area. Warnings and errors are listed with information specific to the module and channel generating the warning or error.

Clear warnings and errors

To clear warnings and errors:

▶ Click the **Delete all errors** button.

Warnings and errors are deleted from the list. A message verifying the action is displayed in the message area.

12.3 Application errors

Error	Cause	Corrective action
Printer is not installed	The Log or Error screen failed to be printed because a printer is not installed.	▶ Verify a default printer is installed on the workstation PC.
Lost communication to the MSE 1000	Communication between MSE-setup and MSE 1000 modules has been lost or failed.	▶ Attempt to recover from the Error screen. If unable to recover from the Error screen, see "Communication errors", page 156 for additional information.
Timeout while the progress bar was waiting for a result	Occurs when a progress bar times out before a process has completed. This error may cause other screens to load incorrectly.	▶ Restart MSEsetup. If the error continues contact HEIDENHAIN technical support.
MSEsetup was not shutdown properly	The workstation was powered off or the application was closed through the operating system instead of the **Close** button. MSEsetup will only need to recover from this error if the System Configuration or Module Configuration file has been corrupted by the improper shutdown.	▶ Restore defaults or ▶ Load previously saved System Configuration and Module Configuration files, see "File options", page 71. If MSEsetup will not open: ▶ Delete the System Configuration and Module Configuration files, see "Installing MSEsetup", page 49 for configuration file locations. ▶ Open MSEsetup.
Setting the IP address failed	The Set Static operation failed.	▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Perform a Broadcast.
The module chain needs to be reconnected	The MSE 1000 modules were powered off while MSEsetup is connected.	▶ Perform a Reconnect.
Error programming module	Programming the firmware or bootloader for a module failed. The Module label and the Communication error will also be displayed.	▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Perform a Broadcast. It may be necessary to power cycle twice in a row to clear the module's state machine if programming fails.

Error	Cause	Corrective action
Warning, error returned from module	An error occurred while communicating to a module. MSE-setup will retry 5 times before the **Lost communication to the MSE 1000** error will occur.	▶ Error recovery is only needed if the **Lost communication to the MSE 1000** error occurs. Refer to this error above.
Duplicate IP Address	More than one module has the same IP address. Clearing the error will cause the error to go away but any resulting module chain will not be usable until the problem is corrected.	DHCP addressing: ▶ Restore factory defaults. Static addressing: ▶ Uninstall one of the modules with the duplicate IP address from the module chain. ▶ Change the IP address of the other module to a unique value. ▶ Reinstall the removed module.
Error	A Query failed. A Communication error and the IP address of the module will displayed.	▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Perform a Broadcast. **Further Information:** "Network troubleshooting", page 161.
Could not create the MSE 1000 module chain via broadcasting	A Broadcast failed.	▶ Verify the network connection is connected. ▶ Verify power to the modules is on. ▶ Verify the workstation IP address. ▶ Verify the workstation netmask. ▶ Verify the broadcast netmask. ▶ Verify the workstation port. ▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Wait for the Network bus LED to flash 2/sec on all modules. ▶ Perform a Broadcast. Refer to "Network troubleshooting", page 161.

Error	Cause	Corrective action
The modules failed to be set	Use DHCP Addressing failed.	▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Perform a Reconnect or Broadcast. ▶ Set the module chain to Use DHCP Addressing.
The image chosen for programming is invalid	An invalid file was selected to program the bootloader or firmware.	▶ Select a valid MSEbootloader.dat or MSEfirmware.dat file.
The checksum failed	The MSEbootloader.dat or MSEfirmware.dat file has become corrupted.	▶ Select a valid MSEbootloader.dat or MSEfirmware.dat file.
The bootloader and firmware cannot be updated while using DHCP	The MSEbootloader.dat or MSEfirmware.dat failed to program since the module is in DHCP mode.	▶ Set the chain to static IP addressing and retry.
All modules are already the desired version	Programming the firmware for All modules failed because the firmware version is the same. Modules can be programmed individually without a check for the version.	▶ Program modules individually.
Password incorrect	An invalid password has been entered for Supervisor mode.	▶ Enter the correct password.
The IP addresses could not be set because of duplicates	The Use Static Addressing button in the networking screen failed to set the modules to their static IP addresses because there are duplicates.	▶ Perform a broadcast and then allow the DHCP addresses to be set as static IP addresses when prompted. or ▶ Set the static IP addresses individually using the Set Static button in the networking screen.

12.4   Module warnings and errors

Current, voltage, temperature, and non-volatile memory are monitored in MSE 1000 modules. Warnings and errors are indicated in the Error screen and the status of the Power LED indicator on the affected module.

Warning or error	Cause	Corrective action
The current exceeds the warning tolerance	**MSE 1201:** The current being drawn from the power supply module is > 2.0 A. **MSE 1202:** The current being drawn from the power supply module is > 2.9 A.	▶ Remove devices and/or modules until the current is below the tolerance. or ▶ Install additional power supply modules into the module chain to meet the current demand.
The current exceeds the error tolerance **Power LED:** Solid red.	**MSE 1201:** The current being drawn from the power supply module is > 2.1 A. **MSE 1202:** The current being drawn from the power supply module is > 3.0 A.	
The 24V supply is below the minimum warning tolerance	The 24 V supplied by the power supply module to other modules is < 21.5 V.	**MSE 1201:** ▶ Contact HEIDENHAIN technical support for assistance. **MSE 1202:** ▶ Verify that the 24 V output from the external power supply is providing the correct voltage. If the external power supply is not operating correctly, refer to the documentation provided with it for troubleshooting information. If the external supply is providing the correct voltage and the warning or error persists: Contact HEIDENHAIN technical support for assistance.
The 24V supply exceeds the maximum warning tolerance	The 24 V supplied by the power supply module to other modules is > 26.5 V.	
The 24V supply is below the minimum error tolerance **Power LED:** Flashes red and green at a rate of once per second.	The 24 V supplied by the power supply module to other modules is < 20 V.	
The 24V supply exceeds the maximum error tolerance **Power LED:** Flashes red and green at a rate of once per second.	The 24 V supplied by the power supply module to other modules is > 28 V.	

Warning or error	Cause	Corrective action
The 5V supply is below the minimum warning tolerance	The module's internal 5 V supply is < 4.9 V.	Contact HEIDENHAIN technical support for assistance.
The 5V supply exceeds the maximum warning tolerance	The module's internal 5 V supply is > 5.3 V.	
The 5V supply is below the minimum error tolerance **Power LED:** Flashes red and green at a rate of twice per second.	The module's internal 5 V supply is < 4.8 V.	
The 5V supply exceeds the maximum error tolerance **Power LED:** Flashes red and green at a rate of twice per second.	The module's internal 5 V supply is > 5.5 V.	
Temperature is below the minimum warning tolerance	The module's CPU temperature is < 0 °C.	▶ Verify that Operating Temperature specifications are being met, see "Module specifications", page 167.
Temperature exceeds the maximum warning tolerance	The module's CPU temperature is > 100 °C.	▶ Verify that Operating Temperature specifications are being met, see "Module specifications", page 167. ▶ Turn the power off. ▶ Allow the module to cool off. ▶ Verify that adequate ventilation is available for the module to remain within operating temperatures. If the error persists contact HEIDENHAIN technical support for assistance.

Warning or error	Cause	Corrective action
Temperature is below the minimum error tolerance **Power LED:** Flashing red and green at a rate of once every three seconds.	The module's CPU temperature is < -5 °C.	▶ Verify that Operating Temperature specifications are being met, see "Module specifications", page 167.
Temperature exceeds the maximum error tolerance **Power LED:** Flashing red and green at a rate of once every three seconds.	The module's CPU temperature is > 110 °C.	▶ Verify that Operating Temperature specifications are being met, see "Module specifications", page 167. ▶ Turn the power off. ▶ Allow the module to cool off. ▶ Verify that adequate ventilation is available for the module to remain within operating temperatures. If the error persists contact HEIDENHAIN technical support for assistance.
The module non-volatile memory is using default data **Power LED:** Flashes red and green at a rate of once every ten seconds.	A module had to use default configuration parameters instead of the normal configuration parameters. Clearing the error will remove it from the Error screen. The error will appear again on the next power-up of the module.	▶ Clear the error in the Error screen. Contact HEIDENHAIN technical support for assistance.
The module non-volatile memory has invalid data, using backup	A module had to use its backup configuration parameters instead of the normal configuration parameters. Clearing the error will remove it from the Error screen. The error will appear again on the next power-up of the module if the backup parameters were not successfully copied.	▶ Verify that the power supply is running at an acceptable level. ▶ Verify that the power supply does not have too many modules connected causing an over-current. If the error persists, contact HEIDENHAIN technical support for assistance.

12.5 Communication errors

The error **Lost communication to the MSE 1000** is sent to the Error screen for communication errors between MSEsetup and MSE 1000 modules. The actual error as well as the module that had the error and the channel, if applicable, will be shown in the Log screen.

If the troubleshooting procedures described in this section are unsuccessful, see "Network troubleshooting", page 161 for additional information.

Error	Cause	Corrective action
Response timeout	A command was sent to a module and failed to obtain a response within the timeout period. The default timeout period is 200 ms.	▶ Check the power and network connection to the modules. ▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Perform a reconnect.
Broadcast failed to get a response	A broadcast returned with no modules found.	▶ Close MSEsetup. ▶ Restart MSEsetup. ▶ Verify that the workstation IP is on the correct domain. ▶ Verify that communication to a module is working with a ping request from the operating system. ▶ Perform a broadcast when communication is verified.
The binding of the UDP socket failed	A broadcast could not be started because the socket failed to bind. This is usually because another application is using the socket and port.	▶ Close MSEsetup. ▶ Restart MSEsetup. ▶ Verify that the workstation IP is on the correct domain. ▶ Verify that communication to a module is working with a ping request from the operating system. ▶ Change the port from the networking screen if another application is using the port. ▶ Perform a broadcast when communication is verified.

Error	Cause	Corrective action
The IP address is used by another module	The IP address requested is already used.	▶ Enter a unique IP address when setting the static IP address.
The IP address is malformed, should be in the format 172.31.46.1	A request was received to set the IP address to 0.0.0.0.	▶ Enter a valid IP address when setting the static IP address.
The IS_CONNECT_IN_SET pin is not high	Modules failed to be ordered after a broadcast was completed because the input pin could not be read on all of the modules. The input pin is set high one at a time starting from the base module in order to determine which module is next in a chain.	▶ Close MSEsetup. ▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Restart MSEsetup. ▶ Perform a Broadcast.
The first module could not be identified	Modules failed to be ordered after a broadcast was completed because the first module could not be found.	▶ Close MSEsetup. ▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Restart MSEsetup. ▶ Perform a broadcast. If the error persists, make sure that there are no cables connected to the first module in the chain.
The file requested could not be opened	The module could not be programmed because the requested file could not be opened.	▶ Select a valid file for programming the bootloader or firmware.
The file requested could not be read	The module could not be programmed because the requested file could not be read.	▶ Select a valid file for programming the bootloader or firmware. If the file is corrupt, a new one can be obtained from HEIDENHAIN.
The module is not in the bootloader	The firmware in the module could not be programmed because the module failed to boot into the bootloader.	▶ Close MSEsetup. ▶ Power cycle the module chain, see "Power cycling", page 48. ▶ Restart MSEsetup. ▶ Perform a broadcast. The module may need to be power cycled twice sequentially to clear out the internal state machine used for programming.

12.6 Module configuration file errors

Error	Cause	Corrective action
Invalid file	The requested configuration file is invalid.	▶ Load a good Module Configuration file, see "File options", page 71.
DOM root element is NULL	The root element of the configuration file is not valid.	▶ Restart MSEsetup.
Invalid tagname for Module-Config	The ModuleConfig tag name was not found in the configuration file.	or
Invalid tagname for the module	The Module tag name was not found in the configuration file.	▶ Delete the Module Configuration file, see "Installing MSEsetup", page 49 for configuration file locations.
Invalid tagname for the channel	The Channel tag name was not found in the configuration file.	▶ Perform a broadcast.
Invalid module list	The tag name for the desired module element could not be found.	
Invalid channel list	The tag name for the desired channel element could not be found.	
Tag name not found	The tag name for the desired element could not be found.	
Failed to overwrite all of the selected modules configurable settings	The file being merged with the ModuleConfig.xml file is invalid.	▶ Choose a different file to merge with the ModuleConfig.xml file.

12.7 Device warnings and errors

Warning	Cause	Corrective action
Calibration needs to be performed	An analog or LVDT device needs to be calibrated.	▶ Recalculate the resolution of the analog or LVDT device.
Mastering must be redone since the device settings changed	A device's setting has been changed that has invalidated the master position.	▶ Clear the warning and re-master the device from the master screen.

12.8 Encoder warnings and errors

Encoder warnings and errors are reported in the Error and Diagnostic screens.
Further Information: "Error screen", page 149.
Further Information: "Diagnostics", page 140.
Refer to the documentation provided with the encoder for troubleshooting information.

12.9 Module chain reconnect warning

Warning	Cause	Corrective action
The module chain needs to be reconnected	This warning occurs when a module has been rebooted or added to the module chain without a reconnect or broadcast. Modules send out broadcasts once every 30 seconds with their network information until they obtain a connection from MSEsetup. The service log will show information regarding the module that is sending the broadcast.	▶ Click the **Delete all errors** button to clear the warning. A dialog window appears requesting confirmation to recover from lost communication. ▶ Click the **OK** button. MSEsetup performs a reconnect. A Broadcast must be performed if a new module has been added to the chain, see "Connection", page 81.

12.10 Referencing warning

Warning	Cause	Corrective action
Referencing has not been completed	Reference marks on 1 V_{PP} encoders have not been traversed.	▶ Traverse reference marks on 1 V_{PP} encoders. **Further Information:** "Referencing", page 109.

12.11 Referencing error

Error	Cause	Corrective action
Referencing failed	The referencing mark type, line count, or signal period may be incorrect for a 1 V_{pp} or TTL encoder. The interpolation may be incorrect for a TTL encoder.	▶ Change the referencing mark type, line count, signal period, or interpolation to the correct value.

12.12 Log file warnings and errors

Warning or error	Cause	Corrective action
The logfile is close to exceeding the maximum size	The log file has exceeded 9 MB and is close to exceeding the 10 MB file size limit. The log file is overwritten with an empty log file each time MSEsetup is opened. This warning occurs when MSEsetup is left on continuously, logging data accumulates, and the log file is not overwritten.	▶ Delete the log file. **Further Information:** "Logging", page 118.
The logfile has exceeded the maximum size and will no longer be updated	The log file has exceeded the 10 MB file size limit. The log file will no longer be written to during operation or overwritten when MSEsetup is opened. The log file is overwritten with an empty file each time MSEsetup is opened. This error occurs when MSEsetup is left on continuously, logging data accumulates, and the log file is not overwritten.	▶ Delete the log file. **Further Information:** "Logging", page 118.
The service logfile is close to exceeding the maximum size	The service log file has exceeded 900 kB and is close to exceeding the 1 MB file size limit. The service log file is overwritten with an empty file each time MSEsetup is opened. This warning occurs when MSEsetup is left on continuously, data accumulates, and the service log file is not overwritten.	▶ Delete the service log file. **Further Information:** "Service log", page 120.
The service logfile has exceeded the maximum size and will no longer be updated	The service log file has exceeded the 1 MB file size limit. The service log file will no longer be written to during operation or overwritten when MSEsetup is opened. The service log file is overwritten with an empty file each time MSEsetup is opened. This error occurs when MSEsetup is left on continuously, data accumulates, and the service log file is not overwritten.	▶ Delete the service log file. **Further Information:** "Service log", page 120.

12.13 Network troubleshooting

12.13.1 Command line tools

Microsoft Windows provides three command line tools that are helpful when troubleshooting network communication problems. The use of these tools may be required during network troubleshooting procedures.

Command line tools:

- Netstat
- Ping
- Ipconfig

Netstat

Netstat can be used to show the IP addresses and ports that are currently open.

To use Netstat:

▶ Open a command line program.
▶ Enter "netstat.exe –noa" into the command line.
▶ Press **Enter** on the keyboard.

The IP address, UDP ports, and process ID are displayed.

Ping

Ping can be used to test network connectivity between the workstation and an MSE 1000 module.

▶ Open a command line program.
▶ Enter "ping [ip_address]" into the command line. [ip_address] is the IP address of the module to ping.
▶ Press **Enter** on the keyboard.

If the ping is successful, a reply will be shown from the requested IP with the size of the packet sent and the time it took to get the response.

If the ping is not successful, the reply "Destination host unreachable" or "Destination net unreachable" will be displayed.

Ipconfig

Ipconfig can be used to show the IP address, netmask, and default gateway of all network adapters.

To use IpConfig:

▶ Open a command line program.

▶ Enter "ipconfig" into the command line.

▶ Press **Enter** on the keyboard.

▶ Locate the network adapter that is being used to connect to the MSE 1000 modules and note the following information:

■ IP address

■ Subnet mask

If using DHCP:

■ Default gateway

■ Router IP address

12.13.2 Basic network troubleshooting

Verify power and LED's

▶ Power cycle the workstation, router, and modules.

▶ Verify that the Link LED on the workstation and router (if applicable) are lit.

▶ Verify that the Network bus LED on the base module is lit.

Verify workstation NIC settings

▶ Verify that the networking settings for the workstation NIC are configured correctly. Refer to the documentation provided with the PC or NIC for instructions.

DHCP IP address assignment: Configure the NIC to Obtain an IP address automatically.

Static IP address assignment: Manually configure the NIC IP address and netmask to the required values. The subnet and netmask of the workstation and modules must match.

Verify workstation IP settings

The settings configured for the workstation IP address and netmask in MSEsetup must match the settings for the workstation NIC.

▶ Look up the IP address and netmask of the workstation NIC using Ipconfig, see "Command line tools", page 161.

▶ Open MSEsetup.

▶ Open the Connect screen, see "Connect screen", page 77.

▶ Set the Workstation IP and netmask to match the values of the workstation NIC, see "Workstation IP", page 79.

▶ Restart MSEsetup.

Verify module IP settings

MSE 1000 module subnet and netmask settings must match the settings applied to the Workstation IP and netmask.

▶ Open the Logging screen, see "Logging", page 118.

▶ Open the Service Log file, see "Service log", page 120.

▶ Power cycle the module chain, see "Power cycling", page 48.

The IP address and netmask of each module is broadcast once every 10 seconds.

▶ Verify that the subnet and netmask of each module matches the workstation subnet and netmask.

Verify firewall settings

If a firewall is being used:

▶ Verify that a firewall is not blocking communication, see "Firewall configuration", page 86.

Verify communication

▶ Verify communication between the workstation and the modules by using the Ping tool, see "Command line tools", page 161.

Verify crossover cable

If a DHCP router is not being used (static IP addresses):

▶ Verify that an RJ-45 crossover cable is being used if required. Some NIC's do not require the use of a crossover cable. Refer to the documentation provided with the workstation or NIC for additional information.

DHCP router configuration

If a DHCP router is being used:

▶ Use IpConfig to verify that the workstation sees the router as a gateway.

▶ Verify that the DHCP router settings are correct, see "Configuring the module chain with DHCP", page 87.

12.13.3 Recovering from IP address conflicts

Restoring modules to factory default settings and following the procedures described here will help recover from communication problems if a subnet or netmask conflict is discovered while troubleshooting.

Recovering with DHCP

Recovering with DHCP IP address assignment:

▶ Restore Factory Defaults, see "Module Chain", page 84.

Restoring factory defaults will set all of the modules to Use DHCP addressing. The modules will obtain an IP address and netmask from the DHCP router.

▶ Configure the module chain with DHCP, see "Configuring the module chain with DHCP", page 87.

Recovering manually

Recovering with static IP address assignment:

▶ Restore Factory Defaults, see "Module Chain", page 84.

Restoring factory defaults will set all of the modules to Use DHCP addressing. The modules will timeout after 45 seconds waiting to obtain an IP address and netmask.

▶ Configure the module chain manually, see "Configuring the module chain manually", page 89.

13 Decommissioning

NOTICE
Dispose of electronic devices in accordance with local regulations.

13.1 Power-off

MSE 1201 (ID 747501-01)

The MSE 1201 (ID 747501-01) power supply module has a power switch for turning power on and off.

To power-off the system:

▶ Press the Off (supply) side of the power switch to power-off the system.

MSE 1201 (ID 747501-02), MSE 1202 (ID 747502-0x)

The MSE 1201 (ID 747501-02) and MSE 1202 (ID 747502-0x) power supply modules do not have a power switch for turning power on and off.

To power-off the system:

▶ Turn power off for the system.

13.2 Disconnect power cords

Disconnect the power cords attached to all power supply modules in the module chain.

MSE 1201 (ID 747501-01)
To disconnect the MSE 1201 (ID 747501-01) power cord:

▶ Verify that the power switch is in the off position.
▶ Verify that the power cord is not plugged into the main power supply.
▶ Remove the female end of the power cord from the power connector **4** on the front of the module.

MSE 1201 (ID 747501-02)
To disconnect the MSE 1201 (ID 747501-02) power cord:

▶ Verify that there is no power at the source.
▶ Un-wire the power cable from the source.

MSE 1202 (ID 747502-0x)
To disconnect the MSE 1202 (ID 747502-0x) power cord:

▶ Verify that the power cord is not plugged into the main power supply.
▶ Turn the connector counterclockwise to loosen the M8 connector.
▶ Remove the power cord connector from the power connector **13** on the front of the module.

13.3 Disconnect data interface connections

Data interface connections vary based on individual MSE 1000 system configurations, see "Data interface connections", page 42 for additional information on available connections.

To disconnect data interface connections:

▶ Disconnect all data interface connections by reversing the installation instructions, see "Data interface connections", page 42.
▶ Remove all device cables and mounting accessories.

13.4 Release all modules

For instructions on releasing modules, see "Releasing a module", page 37.

14   Technical specifications

The MSE 1000 is an advanced system for performing production integrated measurements at high levels of precision and accuracy. The products described in these instructions are designed for indoor use only. The MSE 1000 components shall only be installed as described in these instructions. Mounting, installation, maintenance and operation are to be performed by qualified personnel only.

14.1   Module specifications

> **ⓘ**   **Further Information:** "Power consumption calculation example", page 33.

	MSE 1201 ID 747501-01[2)]	MSE 1201 ID 747501-02[1)]	MSE 1202 ID 747502-01[1)] ID 747502-02[2)]
Power input	AC 100 V ... 240 V (±10 %) 50 Hz ... 60 Hz (±2 %) (max. 108 W)		DC 24 V (±10 %) (max. 72 W)
Rated power output	50.4 W		72 W
Replaceable fuse	T 1 A / 250 V, 5 mm x 20 mm Qty. 2		T 3.15 A / 250 V, 5 mm x 20 mm
Data transfer	Standard Ethernet, IEEE 802.3		
Addressing	Fixed IP address or DHCP		
Operating temperature	0 °C ... 45 °C		
Storage temperature	-20 °C ... 70 °C		
Relative humidity	≤ 80 %		
Altitude	≤ 2000 m		
Degree of protection	[1)]IP65, [2)]IP40		
Overvoltage category	II, intended to be supplied from the building wiring		
Pollution degree	2		
Mass	720 g	960 g	560 g

MSE 1110, MSE 1310: EnDat modules

	MSE 1114 ID 747499-01[1] ID 747499-02[2]	MSE 1314 ID 747503-01[1] ID 747503-02[2]	MSE 1318 ID 747504-01[1] ID 747504-02[2]
Power consumption[3]	3.5 W	3.3 W	4.4 W
Data transfer	Standard Ethernet, IEEE 802.3		
Addressing	Fixed IP address or DHCP		
Operating temperature	0 °C ... 45 °C		
Storage temperature	-20 °C ... 70 °C		
Relative humidity	≤ 80 %		
Altitude	≤ 2000 m		
Degree of protection	[1]IP65, [2]IP40		
Overvoltage category	II, intended to be supplied from the building wiring		
Pollution degree	2		
Mass	620 g	480 g	740 g

[3] Power requirement of the module. Connected length gauges and encoders must be considered additionally.

MSE 1120, MSE 1320: TTL modules

	MSE 1124 ID 747511-01[1] ID 747511-02[2]	MSE 1324 ID 747512-01[1] ID 747512-02[2]	MSE 1328 ID 747513-01[1] ID 747513-02[2]
Power consumption[3]	2.7 W	2.4 W	2.5 W
Data transfer	Standard Ethernet, IEEE 802.3		
Addressing	Fixed IP address or DHCP		
Operating temperature	0 °C ... 45 °C		
Storage temperature	-20 °C ... 70 °C		
Relative humidity	≤ 80 %		
Altitude	≤ 2000 m		
Degree of protection	[1]IP65, [2]IP40		
Overvoltage category	II, intended to be supplied from the building wiring		
Pollution degree	2		
Mass	620 g	440 g	640 g

[3] Power requirement of the module. Connected length gauges and encoders must be considered additionally.

MSE 1180, MSE 1380: 1 V_PP modules

	MSE 1184 **ID 747500-01**[1] **ID 747500-02**[2]	**MSE 1384** **ID 747505-01**[1] **ID 747505-02**[2]	**MSE 1388** **ID 747506-01**[1] **ID 747506-02**[2]
Power consumption[3]	3.8 W	3.5 W	5.0 W
Data transfer	Standard Ethernet, IEEE 802.3		
Addressing	Fixed IP address or DHCP		
Operating temperature	0 °C ... 45 °C		
Storagetemperature	-20 °C ... 70 °C		
Relative humidity	≤ 80 %		
Altitude	≤ 2000 m		
Degree of protection	[1]IP65, [2]IP40		
Overvoltage category	II, intended to be supplied from the building wiring		
Pollution degree	2		
Mass	640 g	440 g	680 g

[3] Power requirement of the module. Connected length gauges and encoders must be considered additionally.

**MSE 1400, MSE 1500: I/O and
Compressed air modules**

	MSE 1401 ID 747507-01[2]	MSE 1401 ID 747507-02[1]	MSE 1501 ID 747508-01[1] ID 747508-02[2]
Power consumption[3]	6.1 W	6.1 W	3.7 W
Data transfer	Standard Ethernet, IEEE 802.3		
Addressing	Fixed IP address or DHCP		
Operating temperature	0 °C ... 45 °C		
Storage temperature	-20 °C ... 70 °C		
Relative humidity	≤ 80 %		
Altitude	≤ 2000 m		
Degree of protection	[1]IP65, [2]IP40		
Overvoltage category	II, intended to be supplied from the building wiring		
Pollution degree	2		
Mass	420 g	440 g	460 g
Input pressure			max. 700 kPa

[3]Power requirement of the module including active inputs and outputs supplied internally.
Further Information: "Switching inputs", page 179 and page 179.

**MSE 1332, MSE 1358: Analog and
LVDT modules**

	MSE 1332 ID 747509-01[1)] ID 747509-02[2)]	MSE 1358 ID 747514-01, [1)]ID 747514-04[2)] ID 747514-02, [1)]ID 747514-05[2)] ID 747514-03, [1)]ID 747514-06[2)]
Power consumption [3)]	3.2 W	4.6 W
Data transfer	Standard Ethernet, IEEE 802.3	
Addressing	Fixed IP address or DHCP	
Operating temperature	0 °C ... 45 °C	
Storage temperature	-20 °C ... 70 °C	
Relative humidity	≤ 80 %	
Altitude	≤ 2000 m	
Degree of protection	[1)]IP65, [2)]IP40	
Overvoltage category	II, intended to be supplied from the building wiring	
Pollution degree	2	
Mass	420 g	620 g

[3)]Power requirement of the module. Connected sensors must be considered additionally.

14.2   Workstation requirements

Component	Minimum	Recommended
PC	Intel® Core™ i5-2520M CPU @ 2.50 GHz or comparable[1]	Intel® Core™ i5 CPU @ 3.3 GHz quad-core or comparable
Operating System (OS)	■ Windows XP ■ Windows Vista ■ Windows 7 ■ Windows 8	
RAM	8 GB	
Available Hard Drive Space	100 MB	
Networking	10/100 Ethernet card	■ 10/100 Ethernet card ■ Router with DHCP server
Video Display Unit	■ 13″ monitor ■ 1280 x 1024 resolution ■ 4:3 aspect ratio	■ 22″ monitor ■ 1920 x 1080 resolution ■ 16:9 aspect ratio
Video RAM	2 GB	
Software		Microsoft Excel 2007
Windows users rights	Administrator	

[1] The measuring data transfer rate of the system strongly depends on the performance of the PC's processor. For dynamic measurements it is required to use a PC with an appropriate performance specification.

14.3 Dimensions
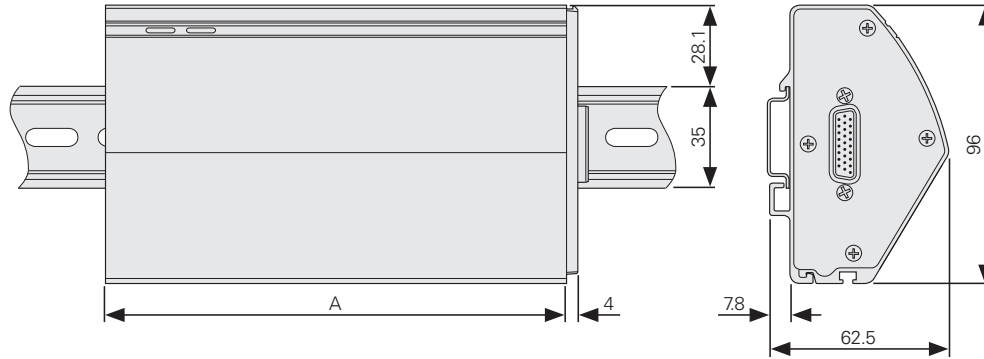
Module

Dimension A	106 mm	159 mm
	MSE 1314	MSE 1201
	MSE 1324	MSE 1202
	MSE 1332	MSE 1114
	MSE 1384	MSE 1124
	MSE 1401	MSE 1184
	MSE 1501	MSE 1318
		MSE 1328
		MSE 1358
		MSE 1388

End covers
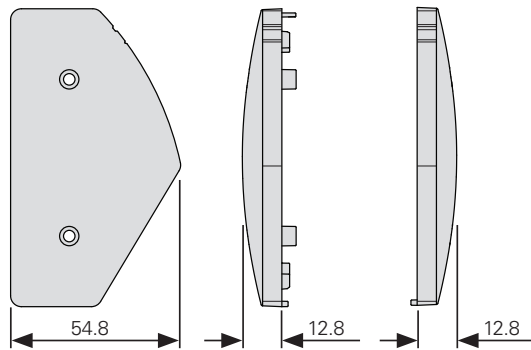
14.4   Accessories

Mounting stand
(ID 850752-01)
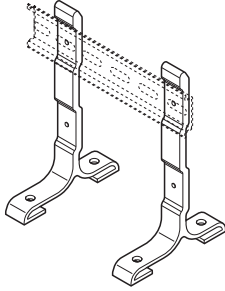
Foot switch
(ID 681041-03)
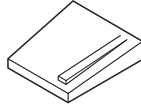
Module connecting cable
(ID 850753-xx)
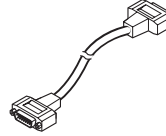
3-Pin M8 male connector
(ID 1071953-01)
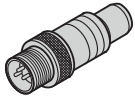
3-Pin M8 female connector
(ID 1071955-01)
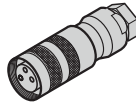
Refer to the instructions provided with an accessory for additional information.

14.5 Connector pin assignments

14								
X103 **Foot switch** MSE 1114, MSE 1124, MSE 1184								
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Switch 1 NO	/	/	/	GND	Switch 2 NO	/	DC 3.3 V	GND

15							
X116 **RJ-45** MSE 1114, MSE 1124, MSE 1184							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
E0 Tx +	E0 Tx −	E0 Rx +	/	/	E0 Rx −	/	/

16							
X11 ... X14 **EnDat** 8-pin coupling, M12 MSE 1114, MSE 1314, MSE 1318							
Power supply				Absolute position values			
8	**2**	**5**	**1**	**3**	**4**	**7**	**6**
U_P	Sensor U_P	0 V	Sensor 0 V	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$
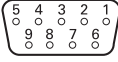
17									
X21 ... X28 **TTL** MSE 1124, MSE 1324, MSE 1328									
Power supply		Incremental signals						Others	Shield
7	**6**	**2**	**3**	**4**	**5**	**9**	**8**	**1**	**Housing**
U_P	0 V	U_{a1}	$\overline{U}_{a1}$	U_{a2}	$\overline{U}_{a2}$	U_{a0}	$\overline{U}_{a0}$	/	Case GND

18										
X1 ... X8 **1 V_{PP}** MSE 1184, MSE 1384, MSE 1388										
Power supply				Incremental signals						Others
4	**12**	**2**	**10**	**1**	**9**	**3**	**11**	**14**	**7**	**5/6/8/ 13/15**
U_P	Sensor U_P	0 V	Sensor 0 V	A+	A-	B+	B-	R+	R-	/

19 **X31, X32** **Analog** MSE 1332									
Power supply 1 max. 83 mA			Power supply 2 max. 1500 mA		Shield		Analog signal		
1	**4**	**3**	**9**	**6**	**5**	**Housing**	**8**	**2**	**7**
– 12 V	+ 12 V	0 V	+ 5 V	0 V	Shield	Case GND	U_A	I_A	$\bar{I}_A$

U_A**:** Analog voltage signal – 10 V to + 10 V; I_A**:** Analog current signal 4 to 20 mA
Cable shield connected to housing

20 **X41 … X48** **Solartron, Tesa half-bridge transducers** MSE 1358 (ID 747514-01, 747514-04)				
1	**2**	**3**	**4**	**5**
U_P	GND	U_{a0}	/	$\overline{U_P}$

20 **X41 … X48** **Mahr half-bridge, LVDT transducers** MSE 1358 (ID 747514-02, 747514-05)				
1	**2**	**3**	**4**	**5**
U_P	U_{a1}	U_{a0}	GND	$\overline{U_P}$

U_{a0}**:** for use with half-bridge transducers
U_{a1}**:** for use with LVDT transducers

20 **X41 … X48** **Marposs LVDT transducers** MSE 1358 (ID 747514-03, 747514-06)				
1	**2**	**3**	**4**	**5**
U_P	$\overline{U_P}$	GND	GND	U_{a0}

X101, X102
I/O terminal block
MSE 1401 (ID 747507-01)
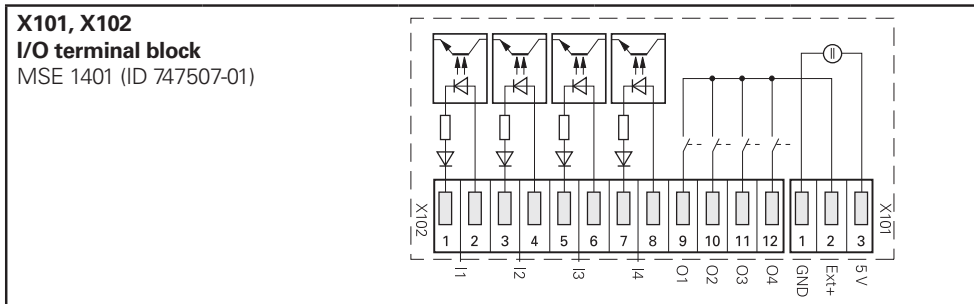
21 I/O				**22 Power**
1	2	3	4	1
In 1 -	In 1 +	In 2 -	In 2 +	GND
5	6	7	8	2
In 3 -	In 3 +	In 4 -	In 4 +	EXT+ In
9	10	11	12	3
Out 1	Out 2	Out 3	Out 4	DC 5 V Out

23
X102: I1 ... I4
3-pin M8 for switching inputs
MSE 1401 (ID 747507-02)

1	3	4
IN X +	/	IN X -

24
X102: O1 ... O4
3-pin M8 for relay outputs
MSE 1401 (ID 747507-02)

1	3	4
OUT X	/	/

25
X101
3-pin M8 for I/O power
MSE 1401 (ID 747507-02)

1	3	4
DC 5 V	DC 5 ... 24 V IN	GND

14.6   Relay outputs

Specifications
$U_L \leq$ 30 V DC/AC
$I_L \leq$ 0.05 A
$t_D \leq$ 25 ms
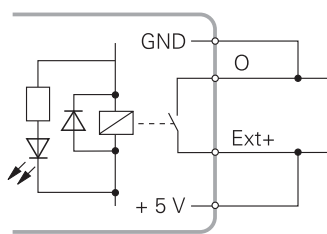
Internal DC 5 V   **External power**
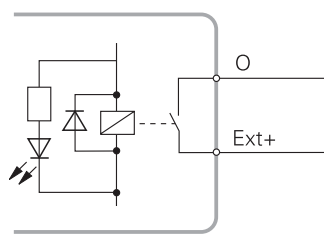
14.7   Switching inputs

Specifications
0 V $\leq U_L \leq$ 1.5 V
4.5 V $\leq U_H \leq$ 26 V
$I_L \leq$ 25 mA
$t_{min} \geq$ 100 ms

Internal DC 5 V   **External power**

15 Index

HEIDENHAIN