Honeywell

Flow Computer

Device Type

FC2000

Migration Guide

How to exchange FC2000 with enCore FC1 Devices

Contact

Elster GmbH (manufacturer)

Steinern Straße 19-21

55252 Mainz-Kastel/Germany

Phone: +49 6134 605-0

Email: info@elster.com

Website: www.elster-instromet.com

Technical Support Flow Computers and Gas Analyzers

Phone: +49 231 937110-88

Email: ElsterSupport@Honeywell.com

Website: www.elster-instromet.com

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1 Purpose of this document

1.1 Background

The FC2000 was discontinued on 31.12.2015. At least until end of 2020 Honeywell Elster© provide spare parts, solutions and service, but after that date we can no longer be guarantee that all spare parts are still available.

The next generation Flow Computer enCore FC1 (in short FC1) offers a wide range of functionalities and has proven itself over the last years to be the logical successor for the FC2000. This migration guide aims to assist you to replace a FC2000 with an enCore FC1.

Purpose of this document is to ...

(1) analyze your current setup (standard configuration only).

(2) find the requirements for the enCore FC1 (hardware configuration).

(3) generally, inform how to perform the migration to an enCore FC1 for a standard application.

1.2 Applicability

Due to the complexity of applications and the difference of the devices this document focuses the following standard applications:

- Gas: 1-stream: turbine meter with 1 or 2 flow directions
- Gas: 1-stream: ultrasonic flow meter with 1 or 2 flow directions

Special Honeywell support is necessary for special application requirements

Please contact our ⇨ technical support team directly in case you have special requirements, such as:

- Gas: multi-stream, density or orifice applications
- Liquid applications
- Steam applications
- Wet gas applications
- Station controller applications
- Liquid prover

This document focuses on the hardware setup and does not describe the parameterization nor the operation of the devices.

Honeywell Elster© will offer a special software configuration service and an on-site migration service. Please contact your local Honeywell Service team for further details.

1.3 Target Group

This migration guide is directed to people dealing with reinvestigation and qualified electricians in the fields of switch cabinet construction and maintenance, as well as qualified field and service personnel with specialized knowledge in device assembly and commissioning.

Before you start – knowledge of the enCore FC1 is mandatory!

The approach of the FC2000 and enCore FC1 differ greatly. Therefore, readers of this document should not only know how flow computers work and how gas is measured in general, but also be familiar with the modular hardware and software design of enCore devices, its mounting, commissioning, parameterization and maintenance.

Honeywell Elster© offers general trainings regarding industrial gas metering and special trainings for the Flow Computer enCore FC1. (⇨ section 4.1 enCore FC manual at a Glance, p. 15)

If required, please contact your local sales representative:
https://www.elster-instromet.com/en/sales-contacts

1.4 Lists with supported Gas Chromatographs and Ultra Sonic Meters

The enCore FC1 does not support all gas chromatographs (GCs) and Ultrasonic Gas Meters (USMs) that are supported by the FC2000. Please check the following lists carefully!

1.4.1 Supported Gas Chromatographs

GCs by	Modell	FC2000	enCore FC
ABB	8000/8100 resp. 8000/8100S	✓	✓
	3100	✓	–
	8200	–	✓
Daniels	2251	✓	✓
	2350	✓	✓
	2551	✓	✓
	2551 – C7	✓	–
Elster Instromet	enCal 2000	✓	–
	enCal 3000	✓	✓
	enCal (India Software)	✓	–
	enSonic	✓	–
	M2000 (GC emulation mode)	✓	–
	Station Controller 793-7SC	✓	–
	enCal US Model	✓	–
Rosemount	GCX	✓	–
Siemens	Optichrome	✓	–
	Maxum 2	✓	–
	Sitrans C6	–	✓
	Sitrans C9	–	✓
Yamatake	HGC303	✓	–
Yokogawa	G1000 MARK II	✓	–

Tabelle 1-1: Supported GCs

1.4.2 Supported Ultrasonic Flow Meters

USMs by	Modell	FC2000	enCore FC
Caldon	LEFM380Ci	–	✓
Daniels	Senor Sonic	✓	✓
Elster Instromet	Ultrasonic resp. Q.Sonic	✓	✓
	Q.Sonic plus/Q.Sonic max	✓	✓
DigitalFlow	Panametrics GM868	✓	–
	Panametrics IGM878	✓	–
Krohne	Altosonic V12	–	✓
	Altosonic V12 – Modicon compatible	–	✓
RMG	USZ08	–	✓
Sick	FLOWSIC 100	✓	–
	FLOWSIC 500	–	✓
	FLOWSIC 600	✓	✓

Tabelle 1-2: Supported USMs

The FC1 does not support *thru-port* functionality directly

In case you are using thru-port functionality with the FC2000, you need to use an external converter like an Adam-4520 in combination with the FC1.

2 Planning the Migration

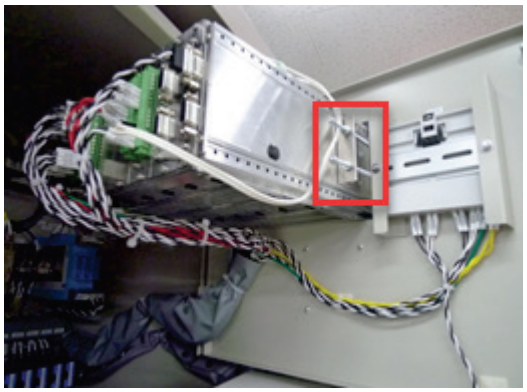
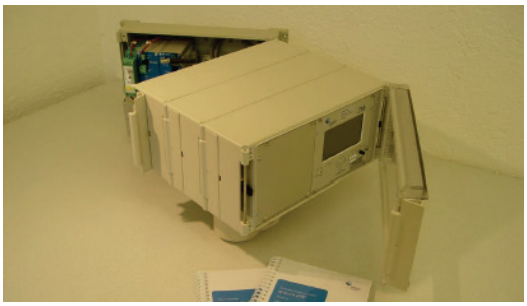
2.1 Analyzing the current FC2000 Setup and corresponding FC1 options

2.1.1 Hardware setup

Housing

FC2000 configuration	⇨ Options for the FC1
☐ 1/2-unit 19'' rack • dimension w/o connectors: 128.5×213×**235** mm (H×W×D) • max. no. of boards: **5** The housing of the FC2000 is deeper than enCore FC1! Therefore, all wires on FC2000 should have a reserve length of 20cm. Fig. 2-1: FC2000 is deeper than an FC1	– 1/2-unit 19'' rack • dimension w/o connectors: 128.5×213×**170** mm (H×W×D) • max. no. of boards: **7** For a 1:1 migration we recommend the use the enCore FC1 in 1/2-unit width. – 1/3-unit 19'' rack • dimension w/o connectors: 128.5×**142**×**170** mm (H×W×D) • max. no. of boards: **4**

Mounting

FC2000 configuration	⇨ **Options with the FC1**
☐ 19'' mounting frame for FC2000 (for 2 × 1/2-units)	– 19" rack for cabinet mounting an enCore FC (for 2×1/2-units or 3×1/3-units) The depth of the 19" racks of FC2000 and FC1 differs! Without connecters, the FC has a depth of 170 mm and the FC2000 235 mm.
☐ panel mounting with mounting brackets  Fig. 2-2: 2 × mounting brackets screwed directly to both sides of the FC2000 (in the predrilled holes provided for this purpose)	– Please contact Elster in this case. – 19'' rack for enCore FC devices (without mounting brackets) The FC1 housing does not provide predrilled holes for the mounting brackets.
	– additionally, the FC1 supports wall mounting housing (*only for 1/3-unit*)  Fig. 2-3: Wall mounting housing for 1/3-unit

Standard applications – modules used

Please note that the boards used for FC2000 and enCore FC device series vary regarding the available interfaces.

In general:

FC2000 modules for standard applications	⇨ Options with the FC1
☐ Turbine gas meter – 1 or 2 flow direction(s) 1 × MPU 1 × PSU 1 × Input (2) 1 × Output	– Turbine meter – 1 or 2 flow direction(s): 1 × CPU3 1 × MFE7 1 × MFA8
☐ Ultrasonic flow meter – 1 or 2 flow direction(s): 1 × MPU 1 × PSU 1 × Input (2) 1 × Comms 1 × Output board	– Ultrasonic flow meter – 1 or 2 flow directions: 1 × CPU3 1 × MFE7 1 × MFA8

Modules/boards in detail:

FC2000 modules in detail	⇨ **Options with the FC1**
☐ PSU and MPU PSU: 1 × Power supply input nominal +24 V DC (21 to 28 C VD) 1 × auxiliary output supply +24VDC (fused) MPU: 2 × DSUB9 female (isolated RS232, RS485 serial channels) Ethernet connector available only in additional Network 2 module.	– CPU3 1 × Power supply input nominal +24 V DC (20.4 to 28.8 C VD) 2 × RJ45 style (RS232, RS485, RS422 serial channels) 1 × Ethernet connector (LAN) Unlike the PSU, the CPU3 has *no* power output.
☐ Input module/Input 2 module 2 × HART inputs (3 transmitters each) 4 × current inputs 4..20mA (24 bit) 1 × Pt100 (3-wire) 3 × digital status inputs 2 × HF inputs 1 × prover pulse output (*Input 2 module only*)	– MFE7 input board (*preferred*) 3 × digital input for HF/LF/Encoder/Message 1 × input for Pt100 (4-wire) 2 × analog inputs 4..20mA or HART (up to 4 transmitter each depending on manufacturer) 1 × RS485 serial interface (RSA/RSB/GND) – ExMFE5 intrinsically safe input board 3 × NAMUR input [Ex ib Gb] IIC for HF/LF/Encoder/Message 1 × input for Pt100 [Ex ib Gb] IIC (4-wire) 1 × analog inputs 4..20mA or HART or HART (up to 4 transmitter each depending on manufacturer) **ExMFE5 Safety Notices** Only transmitters and pulse sensors that follow at least the requirements of the intrinsically safe protection class [Ex ib Gb] II C may be connected to the ExMFE5 assembly terminals provided for that purpose. A mixed connection of intrinsically safe and non-intrinsically safe circuits is not permitted for these assemblies.
☐ Comms module 2 × DSUB9 female (isolated RS232, RS485 serial channels)	– ESER4 1 × Ethernet connector (LAN) 3 × RJ45 style (RS232, RS485, RS422 serial channels)
☐ Output module 12 × isolated switching outputs 4 × analog outputs 0/4..20 mA	– MFA8 output board 1 × PhotoMos output (NC, max. 28.8 V, 120 mA) 3 × PhotoMos outputs (NO, max. 28.8 V DC, 120 mA) 4 × analog outputs 0/4..20 mA In case all digital outputs of the FC2000 Output module are in use, the FC1 must be equipped with 3×MFA8 boards.

Network boards

FC2000 configuration	⇨ Options with the FC1
☐ Network 2 module 1 × Ethernet connector (LAN)	– CPU3 (*default board*) 1 × Ethernet connector (LAN) – ESER4 (*optional*) 1 × Ethernet connector (LAN) 3 × RJ45 style (RS232, RS485, RS422 serial channels) For 1/3-unit 1×ESER4 board can be installed in slot 4 only; for 1/2-unit up to 2×ESER4 boards can be installed in slots 6 and 7.

External options

FC2000 configuration	⇨ Options with the FC1
☐ Counter module 1..4 counter	– *(not supported)*
☐ Ink printer module	– *(not supported)* The FC2000 printer unit is technically outdated and can be unmounted. In the FC1 this functionality is realized with a more powerful Printer AFB which can print on either a network or serial printer.

2.1.2 Digital Data Communication

Data communication is independent of the standard application used.

Modbus

FC2000 configuration	⇨ Options with the FC1
☐ Modbus (ASCII, RTU) via serial RS232/RS485 communication (MPU or Comms module)	– Modbus (ASCII, RTU) via serial RS232/RS485 communication and additionally RS422 (serial channels of CPU or ESER4) Master and Slave operation mode Latching of registers is not supported by the FC1.
☐ Modbus TCP via a standard TCP/IP network (`LAN` of Network 2 module)	– Modbus TCP via a standard TCP/IP network (`LAN` of CPU or ESER4) Server and Client operation mode

Remote front panel access

	FC2000 configuration	⇨ **Options with the FC1**
Name	“Remote front panel access”	“Remote operation panel”
Data protocol	• HTTP	• Currently HTTP, planned to switch to secured MMS
Prerequisite	active connection between PC and FC2000... • via LAN (Ethernet 2 module)	active connection between PC and FC1 ... • via network (LAN of CPU or ESER4), or • locally via USB connection
Access	• via web browser (e.g. Microsoft Edge) using the IP address of the device	• currently via web browser (e.g. Microsoft Edge) using the IP address of the device (outdated) • via enSuite

Connection between Service PC and device (e.g. for parameterization)

Connection	**FC2000**	⇨ **Options with the FC1**
locally	• via USB Type A on Type A (male)	• USB Type A on Type B
via network	• via LAN if Ethernet 2 module is installed	• via LAN of CPU or ESER4

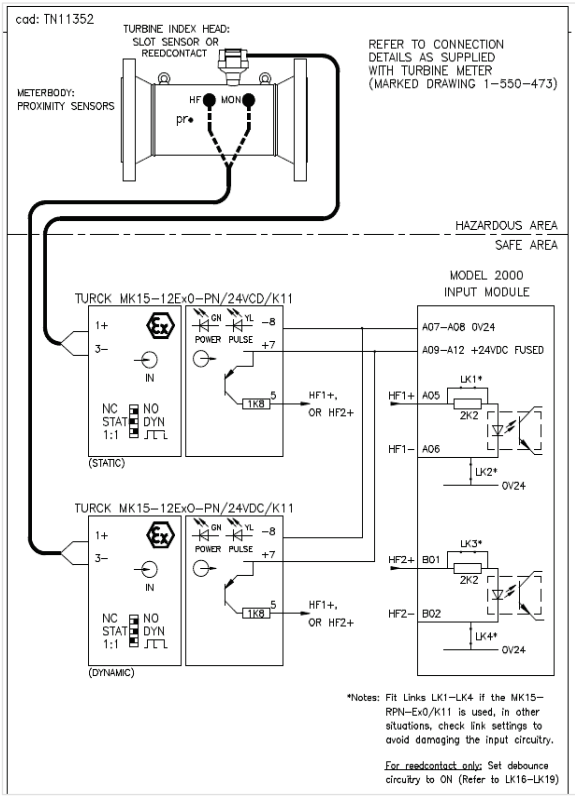
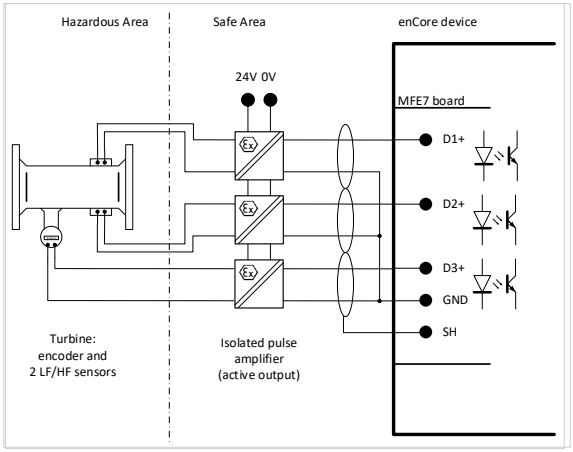
Retrieving archives

FC2000 configuration	⇨ **Options with the FC1**
☐ via Modbus	– via Modbus
☐ via M2000 configuration software	– via enSuite
	– additionally, directly via operation panel

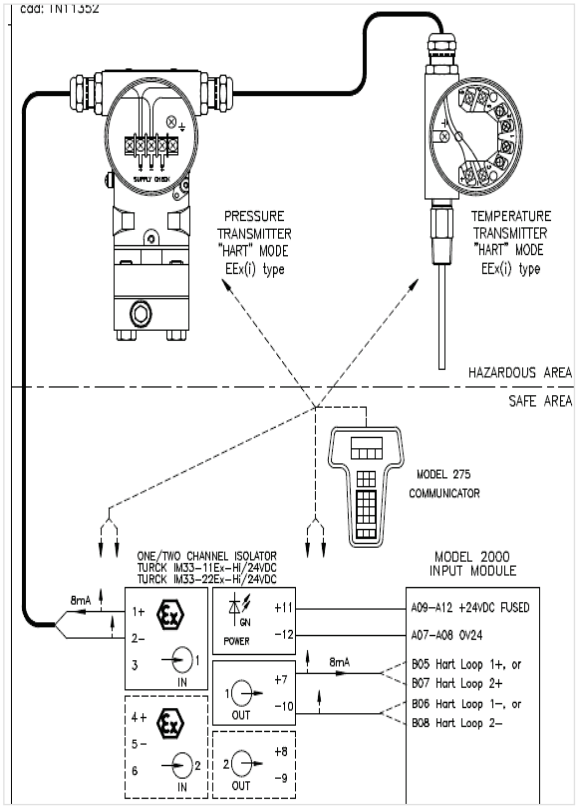
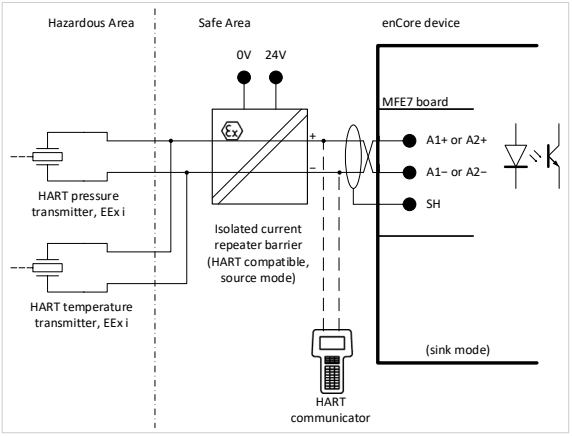
2.2 Connection diagrams

This section shows technical drawings on how turbine and ultrasonic flow meters are connected to an FC2000 and how the connections look like for an FC1.

2.2.1 Turbine meter (EEx i): FC2000 Input module vs. FC1 MFE7 input board

FC2000 configuration	**⇨ Options with the FC1**
	
• internal power supply The barriers are fed by the input board (PIN: `A07-A08 - 024` and `A09-A12 - 24` V DC (fused))	• separate power supply In case you want to continue to use the barriers, you must feed these with a separate power supply. Alternatively, you can replace the Input (2) module with an ExMFE5 (instead of a MFE7), which has barriers integrated, instead of the external barriers.

2.2.2 HART Measurement Transmitter (EEx i): FC2000 Input module vs. FC1 MFE7 input board

FC2000 configuration	⇨ **Options with the FC1**
	
• internal power supply The barriers are fed by the input board (PIN: `A07-A08 - 024` and `A09-A12 - 24` V DC (fused))	• separate power supply In case you want to continue to use the barriers, you must feed these with a separate power supply. Alternatively, you can replace the Input (2) module with an ExMFE5 (instead of a MFE7) with a FC1 and no barrier. **HART transmitter with high inrush current** Please note that depending on the type and manufacturer of a HART transmitter, it may not be possible to operate more than one transmitter in a HART loop. This is the case with transmitters that require a high inrush current and therefore exceed the input current limit of 20 mA.

3 FAQ

3.1 enCore FC manual at a Glance

The manual for the enCore FC device series is modular. It consists of the following volumes:

- “Instructions for Use in Legal Metrology”
  This volume focuses on the legally relevant properties and functions of the FC1 flow computer.
- “Operating Instructions”
  This volume describes the assembly, installation, commis¬sioning and maintenance of all enCore FC devices.
- “Configuration of Device Software”
  This volume describes parameterizing devices of the enCore series with the software system enSuite, the software download and further services.
- “Basic System with SFBs”
  This volume describes the basic system, which provides all basic functions of the device software. The basic system e.g. manages the system resources, the I/O boards or the connection to other devices via digital protocols.
- Functionality of individual **A**pplication **F**unction **B**locks (AFBs)
  Each volume describes the parameterization, function and operation of each AFB. These volumes always describe the full range of functions of the respective AFBs.

In our docuthek you can download the latest versions of our manuals:
www.docuthek.com

4 Technical Data: FC2000 vs. enCore FC1

4.1 General information

	FC2000	enCore FC1
Housing/dimensions	available in 1 width: • 1/2 width plug-in unit in 19" design, 3U dimensions w/o connectors: 128.5×213×**235** mm (H×W×D) • dimensions with connectors (approx.): 128.5×213×**255** mm (H×W×D)	available in 2 widths: • 1/2 width plug-in unit in 19" design, 3U dimensions w/o connectors: 128.5 × 213 × **170** mm (H×W×D) dimensions with connectors (approx.): 128.5 × 213 × **220** mm (H×W×D) • 1/3 width plug-in unit in 19" design, 3U: dimensions w/o connectors: 128.5 × **142** × **170** mm (H×W×D) dimensions w connectors (approx.): 128.5 × 142 × **220** mm (H×W×D)
Weight	(fully equipped) • 1/2-unit width: approx. 2.5 kg	(fully equipped) • 1/3-unit width: approx. 1.3 kg • 1/2-unit width: approx. 2.1 kg
Ambient conditions	• ambient temperature range: 0 °C up to +60 °C • humidity < 90 %, non-condensing • installation outside Ex zones 0, 1 and 2 only	• ambient temperature range −10 °C up to +55 °C • humidity < 90 %, non-condensing • installation outside Ex zones 0, 1 and 2 only
Calibration/security switch	• on the left side	• on the front
USB parameter cable	• Type A (both sides)	• Type A and type B
IrDA parameter interface	• Only for devices of the early device series	
Communication ports:		
RS232	• CPU- and Comms module: DSUB9 female, grounded shield not connected Pin assignment: RxD pin 2 TxD pin 3 SGND pin 5	• CPU3 and ESER4: RJ45 style, grounded shield connected Pin assignment: RxD pin 3 TxD pin 1 SGND pin 5
RS485	• CPU- and Comms module: DSUB9 female, grounded shield not connected Pin assignment: line A pin 9 line B pin 6	• CPU3 and ESER4: RJ45 style, grounded shield connected Pin assignment: data A pin 1 data B pin 2 • MFE7: serial interface (`RSA/RSB/GND`) Pin assignment: data A RSA data B RSB

RS422	/	• CPU3 and ESER4: RJ45 style, grounded shield connected Pin assignment: data A pin 1 data B pin 2

5 Appendix

- enCore FC1 Product Ordering Sheet V1

enCore FC1 Product Ordering Sheet V1 17.11.2017

Customer:_____ Order Number:_____ Date:_____

Options		Configuration (Standard is bold)
Basic Device	Housing size	☐ 1/2 19“ Rack ☐ 1/3 19“ Rack
	Mode Stream 1	☐ **Turbine 1 Flow Direction (connected via pulses)** ☐ Turbine 2 Flow Direction (connected via pulses) ☐ Ultrasonic 1 Flow Direction (connected via protocol) ☐ Ultrasonic 2 Flow Direction (connected via protocol
	Mode Stream 2	☐ Turbine 1 Flow Direction (connected via pulses) ☐ Turbine 2 Flow Direction (connected via pulses) ☐ Ultrasonic 1 Flow Direction (connected via protocol ☐ Ultrasonic 2 Flow Direction (connected via protocol
	Additional I/O Boards	Max. number of boards in 1/2 size is 7; in 1/3 size is 4 ☐ ExMFE5, Number ____ ☐ MFE7, Number ____ ☐ MFA8, Number ____ ☐ ESER4, Number ____ (max. 2)
Test	Calibration	☒ **factory calibration** ☐ MID (transmitters needed) ☐ function tested
Installatio	Installation	☐ **None** ☐ 19“ mounting frame ☐ Wall mounting kit (small housing)
Comm.	Modem	☐ **None** ☐ UMM (Universal Mobilfunk Modem – GPRS/UMTS Router)

enCore FC1 Product Ordering Sheet V1 17.11.2017

Customer:_____ Order Number:_____ Date:_____

Options		Configuration (Standard is bold)
Pressure Transmitter	Honeywell STA84LB Basic	☐ Pressure Range 0,9 - 6 Bara ☐ Pressure Range 1,75 - 35 Bara
	Honeywell STA87LB Basic	☐ Pressure Range 20 - 100 Bara
	Honeywell STA84LB Extra	☐ Pressure Range 0,9 - 6 Bara (higher accuracy + Display) ☐ Pressure Range 1,75 - 35 Bara (higher accuracy + Display)
	Honeywell STA87LB Extra	☐ Pressure Range 20 - 100 Bara (higher accuracy + Display)
Temperature Transmitter	Jumo PT100 (4 wire)	Built in length (EBL) ☐ EBL 50 ☐ EBL160 ☐ EBL 250
	Honeywell STT850 (HART)	☐ EBL 50 ☐ EBL160 ☐ EBL 250

Project / Reference / Comments:

_____

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_____

Customer:_____

_____

Contact Person: _____

Tel.:_____ E-Mail:_____