

Foreword

Rationale

Modern field devices have flexible applications and, alongside their actual automation function, provide a wide range of other data and functions. In order to make this constantly increasing functionality operable, various device-integration technologies with different strengths and weaknesses have been developed over the years. With FDI, a future-proof technology has now come into being, which builds on the strengths of current technologies and combines them effectively with new concepts in a flexible architecture.

What all of these integration technologies have in common is that they need to tackle various topic areas; after all, they are dealing with the integration of numerous functions. These topics begin with equipment engineering, move on to aspects of industrial communication and then to the open-loop control or process control level with their special characteristics and requirements. Device integration is thus always a multi-layered topic in which various technologies generally interact in order to bring about the overall result, namely the provision of field-device data and functions in automation systems.

FDI also deals with these topic areas. This is also demonstrated by the structure of the FDI specification. This consists of seven specification parts and five annexes for communications profiles. In addition, the FDI specification references other specifications, such as the Electronic Device Description Language or OPC Unified Architecture. In such technical specifications, the description of normative facts is naturally the focus. A detailed explanation of relationships on the basis of examples, on the other hand, is not the task of the specifications.

This is precisely where this book comes into play – it brings together the various parts of the FDI specification and technology in a common context and describes the relationships that are often distributed across multiple parts of the specification. In addition, examples are included that clearly explain how to use the FDI technology.

Who should read this book?

This book is primarily intended for two groups of people. On the one hand, individuals who are interested in the FDI technology and would like to gain an overview of its functions and, on the other hand, device developers who plan to develop an FDI-based integration solution, known as FDI packages. For device developers, the book goes into detail about the content of FDI packages and explains the use of the FDI technology using examples that are based on actual use cases. The creation process for FDI packages and the tools required for this are also included in the book.

How is the book structured?

This book is concerned with the integration technology Field Device Integration – FDI. Chapter 1 provides an introduction to the world of field devices in automation engineering. An overview of the history of device integration and the technologies that have arisen rounds off the chapter.

Chapter 2 describes the function of FDI and the key features of the technology. This includes the FDI package as device representation and the client/server structure of FDI. The FDI information model as an open access point to the device information is also explained. Based on examples, principle procedures in an FDI environment are illuminated.

As, besides providing a general description of the FDI technology, the book is primarily aimed at device developers, the subsequent chapters 3, 4 and 5 focus on the FDI package as well as the technologies and development tools used.

For this, chapter 3 explains the basic technologies used in the FDI packages. The starting point is the Electronic Device Description Language (EDDL). Large parts of the FDI packages are implemented using this. As EDDL has already been established as a technology for many years and there is more detailed literature on this topic, only the basics of the Description Language are explained at this point. The concept of programmable user interfaces that are loaded on request as what are known as User Interface Plugins (UIP), by contrast, is new. For this reason, the underlying technologies and mechanisms for these interfaces are described in great detail. The packaging mechanism of FDI, which follows the Open Packaging Convention, is also described here.

Following the presentation of the basic technologies, chapter 4 is concerned with the use of these technologies. For this purpose, concrete use cases are presented, which are then implemented as examples making use of the FDI technologies. This chapter in a sense acts as a recipe book with ideas for designing FDI packages. The solutions described use both EDDL and UIPs.

At this point in the book, you are now familiar with the technologies and their uses for solving concrete problems. However, you still do not know how FDI packages are actually generated. Chapter 5 therefore deals with the creation process for FDI packages. For this purpose, the components of FDI packages and the tools connected to these are presented. In particular the FDI package IDE is a focus of this chapter as this is the development tool provided by FDI. Based on clear explanations, we describe the use of the FDI package IDE for creating FDI packages. Finally, potentials for automation within the development process are discussed.

Chapter 6, as the final chapter, briefly summarizes the content of the book and provides an overview of possible developments.

The content of this book was created based on FDI specification IEC 62 769 (V1.0, available for download <http://www.fieldcommgroup.org/tools/fdi.html>). The FDI package examples are delivered with the FDI IDE available online under the same URL mentioned above. These examples serve to illustrate concepts. No liability is accepted for the use of the examples.

Acknowledgments

Writing a book is a team effort. And this does not just mean the author team, but above all also all those who have contributed to the successful completion with their support. Our thanks therefore go to the FDI Cooperation, above all to Mr. Kumpfmüller as Board Chairman and Mr. Laubenstein as Executive Director, who provided us with the necessary documents and software. However, we would also like to thank all the members of the FDI working groups for the in-depth discussions during the specification work, but more importantly also beyond that. Such a book is created primarily during leisure time. Therefore our families, who patiently supported our “hobby”, deserve a special thank you.

Fall 2015

Daniel Großmann
Michael Braun
Benjamin Danzer
Matthias Riedl
Alexander Kaiser