ISO 21919-2:2021 (E)

Physical device control — Interfaces for automated machine tending — Part 2: Safety and control interface

Contents

Foreword

Introduction

- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 Description of the interfaces
 - 4.1 General
 - 4.2 Characteristics of the interface
 - 4.2.1 General
 - 4.2.2 Conformance class
 - 4.2.2.1 General
 - 4.2.2.2 Conformance class 1: Minimum set of signals
 - 4.2.2.2.1 General
 - 4.2.2.2.2 Simple unloading
 - 4.2.2.2.3 Simple loading
 - 4.2.2.2.4 Simple combined unloading and loading
 - 4.2.2.3 Conformance class 2: Extended set of signals
 - 4.2.2.3.1 General
 - 4.2.2.3.2 Unloading with non-coherent transfer, with/without clamping function
 - 4.2.2.3.3 Unloading with coherent transfer
 - 4.2.2.3.4 Loading with non-coherent transfer, with/without clamping function
 - 4.2.2.3.5 Loading with coherent transfer
 - 4.2.2.3.6 Combined unloading and loading with non-coherent transfer, with/without clamping function
 - 4.2.2.3.7 Combined unloading and loading with coherent transfer
 - 4.2.2.3.8 Preparation of a part
 - 4.2.2.3.9 Emptying
 - 4.2.2.3.10 Function of guard doors
 - 4.2.2.3.11 Further status functions
 - 4.2.2.4 Conformance class 3: Extended set of signals with process optimization
 - 4.2.2.4.1 General
 - 4.2.2.4.2 Process optimizations at combined unloading and loading
 - 4.2.2.4.2.1 General
 - 4.2.2.4.2.2 With coherent transfer
 - 4.2.2.4.2.3 With non-coherent transfer, with/without clamping function
 - 4.2.2.4.3 Process optimizations, if pre-positioning by machine
 - 4.2.2.4.4 Process optimizations, if clamping and releasing is executed in more than one step
 - 4.2.3 Conformance options
 - 4.2.3.1 General
 - 4.2.3.2 Conformance option: Loading access controlled by machine
 - 4.2.3.3 Conformance option: Loading access controlled by automated machine tending system
 - 4.2.3.4 Conformance option: Enabling device
 - 4.2.3.5 Conformance option: Monitoring of communication
 - 4.2.3.6 Conformance option: Tool life management
 - 4.2.3.7 Conformance option: Central functions
 - 4.2.3.8 Conformance option: Control signals for safety-relevant functions
 - 4.2.3.9 Conformance option: With parts data

- 4.2.3.9.1 General
- 4.2.3.9.2 Signals for controlling data handling
- 4.2.3.9.3 Preparation data and parts data
- 4.2.3.9.3.1 Signal names and content of preparation data and parts data
- 4.2.3.9.3.2 Use of preparation data and parts data
- 4.2.3.10 Conformance option: Setup information
- 4.2.3.11 Conformance option: Machine panel
- 4.2.3.12 Conformance option: Part seat control
- 4.3 Safety interface
- 4.3.1 General
- 4.3.2 Principle approach and concept
- 4.3.3 Matrix for safety-related functional relationships
- 4.3.4 Distribution of performance levels and PFHD value
- 4.4 Control interface

5 Extension of the interfaces

- 5.1 General
- 5.2 Examples of project-specific extensions
- 5.2.1 General
- 5.2.2 Additional signals
- 5.2.3 More than one interference area
- 5.2.3.1 Separated safety areas
- 5.2.3.2 The same safety area
- Annex A (normative) List of signals

Annex B (informative) Examples for safety matrices

- B.1 General
- B.2 Example 1: System configuration with loading setup space without (closable) loading access
- B.2.1 Configuration
- B.2.2 Safety matrix
- B.2.3 Explanation of the scenarios
- B.2.3.1 Development of the matrix
- B.2.3.2 Scenario 0
- B.2.3.3 Scenario 1
- B.2.3.4 Scenario 2
- B.2.3.5 Scenario 3
- B.2.3.6 Scenario 4
- B.2.3.7 Scenario 5
- B.2.3.8 Scenario 6
- B.2.3.9 Scenario 7
- B.2.3.10 Scenario 8
- B.3 Example 2: Loading setup space with loading access
- B.3.1 Configuration
- B.3.2 Safety matrix
- B.3.3 Explanation of the scenarios
- B.3.3.1 Development of the matrix
- B.3.3.2 Scenario 0
- B.3.3.3 Scenario 1
- B.3.3.4 Scenario 2
- B.3.3.5 Scenario 3
- B.3.3.6 Scenario 4
- B.3.3.7 Scenario 5
- B.3.3.8 Scenario 6
- B.3.3.9 Scenario 7
- B.3.3.10 Scenario 8
- B.3.3.11 Scenario 9
- B.3.3.12 Scenario 10
- B.4 Example 3: Loading of workspace with loading access from above for several machines
- B.4.1 Configuration
- B.4.2 Safety matrix
- B.4.3 Explanation of the scenarios

- B.4.3.1 Development of the matrix
- B.4.3.2 Scenario 0
- B.4.3.3 Scenario 1
- B.4.3.4 Scenario 2
- B.4.3.5 Scenario 3
- B.4.3.6 Scenario 4

Annex C (normative) Flow charts

- C.1 Conformance class 1
- C.1.1 Simple unloading
- C.1.2 Simple loading
- C.1.3 Simple combined unloading and loading
- C.2 Conformance class 2
- C.2.1 Unloading with non-coherent transfer, with/without clamping function
- C.2.2 Unloading with coherent transfer
- C.2.3 Loading with non-coherent transfer, with/without clamping function
- C.2.4 Loading with coherent transfer
- C.2.5 Combined unloading and loading with non-coherent transfer, with/without clamping function
- C.2.6 Combined unloading and loading with coherent transfer
- C.2.7 Emptying
- C.2.8 Functions of guard doors
- C.3 Conformance class 3
- C.3.1 Process optimizations at the combined unloading and loading with non-coherent transfer, with/without clamping function
- C.3.2 Process optimizations at the combined unloading and loading with coherent transfer
- C.4 Conformance options
- C.4.1 Monitoring of communication
- C.4.2 Conformance option: With parts data
- C.4.2.1 Loading with preparation data from the machine to the automated machine tending system
- C.4.2.2 Unloading with preparation data from the machine to the automated machine tending system
- C.4.2.3 Loading with preparation data from the automated machine tending system to the machine
- C.4.2.4 Unloading with preparation data from the automated machine tending system to the machine
- C.4.2.5 Unloading with parts data
- C.4.2.6 Loading with parts data
- C.4.2.7 Loading with part reference number
- C.4.3 Conformance option: Part seat control

Page count: 44