CONTENTS

INTRODUCTION....8
1 Scope....9
2 Normative references....9
3 Terms and definitions....9
General....14
1.1 Purpose....14
1.2 Version number....14
1.3 System structure and architecture....14
1.4 System information flow....15
1.5 Command types....15
1.6 Bus units....16
1.6.1 Transmitters and receivers in bus units....16
1.6.2 Control gear....16
1.6.3 Input device....16
1.6.4 Single master application controller....16
1.6.5 Multi-master application controller....17
1.6.6 Sharing an interface....17
1.7 Bus power supply and load calculations....18
1.7.1 Current demand coverage....18
1.7.2 Maximum signal current compliance....18
1.7.3 Simplified system calculation....18
1.8 Wiring....18
1.8.1 Wiring structure....18
1.8.2 Wiring specification....18
1.9 Insulation....19
1.10 Earthing of the bus....19
1.11 Power interruptions at bus units....19
1.11.1 Different levels of power interruptions....19
1.11.2 Short power interruptions of external power supply....19
1.11.3 External power cycle....20
1.11.4 Short interruptions of bus power supply....20
1.11.5 Bus power down....20
1.11.6 System start-up timing....20
Electrical specification....22
2.1 General....22
2.2 Marking of the interface....22
2.3 Capacitors between the interface and earth....22
2.4 Signal voltage rating....22
2.5 Signal current rating....23
2.6 Marking of bus powered bus unit....23
2.7 Signal rise time and fall time....23
Bus power supply....25
3.1 General....25
3.2 Marking of the bus power supply terminals....25
3.3 Capacitors between the interface and earth....25

3.4 Voltage rating 25
3.5 Current rating 25
3.5.1 General current rating 25
3.5.2 Single bus power supply current rating 26
3.5.3 Integrated bus power supply current rating 26
3.5.4 Dynamic behaviour of the bus power supply 26
3.6 Bus power supply timing requirements 27
3.6.1 Short power supply interruptions 27
3.6.2 Short circuit behaviour 28
Transmission protocol structure 28
4.1 General 28
4.2 Bit encoding 28
4.2.1 Start bit and data bit encoding 28
4.2.2 Stop condition encoding 29
4.3 Frame description 29
4.4 Frame types 29
4.4.1 16 bit forward frame 29
4.4.2 24 bit forward frame 29
4.4.3 Reserved forward frame 29
4.4.4 Backward frame 29
4.4.5 Proprietary forward frames 29
Timing 30
5.1 Transmitter timing 30
5.1.1 Transmitter bit timing 30
5.1.2 Transmitter frame sequence timing 31
5.2 Receiver timing 31
5.2.1 Receiver bit timing 31
5.2.2 Receiver bit timing violation 33
5.2.3 Receiver frame size violation 33
5.2.4 Receiver frame sequence timing 33
5.2.5 Reception of backward frames 34
5.3 Multi-master transmitter timing 34
5.3.1 Multi-master transmitter bit timing 34
5.3.2 Multi-master transmitter frame sequence timing 35
Method of operation 35
6.1 Collision avoidance, collision detection and collision recovery 35
6.1.1 General 35
6.1.2 Collision avoidance 36
6.1.3 Collision detection 36
6.1.4 Collision recovery 37
6.2 Transactions 39
6.3 Send-twice forward frames and send-twice commands 39
6.4 Command iteration 39
6.5 Usage of a shared interface 40
6.5.1 General 40
6.5.2 Backward frames 40
6.5.3 Forward frames 40

6.6 Use of multiple bus power supplies 40
6.7 Command execution 41
Declaration of variables 41
Definition of commands 41
Test procedures 41
9.1 General notes on test 41
9.1.1 Abbreviations 41
9.1.2 Ambient temperature 41
9.1.3 External power supply voltage and frequency 42
9.1.4 Measurement requirements 42
9.1.5 Test signal generators and bus voltage sources 42
9.1.6 Deviation from documentation 42
9.1.7 Test setup 42
9.1.8 Notation 42
9.2 General interface tests 48
9.2.1 Label and literature check 48
9.2.2 Interface marking check 48
9.2.3 Bus powered bus unit marking check 49
9.2.4 Bus power supply marking check 51
9.2.5 Insulation test 53
9.2.6 Capacitor check 54
9.3 Bus power supply tests 54
9.3.1 Voltage rating test 54
9.3.2 Voltage rise time test 55
9.3.3 Current rating test 55
9.3.4 Dynamic behaviour test 57
9.3.5 Power-on open circuit test 59
9.3.6 Power-on timing test 60
9.3.7 Power supply short interruptions test 61
9.3.8 Power supply short circuit test 62
9.3.9 Power supply current consumption test 63
9.4 Control device tests 64
9.5 Control gear tests 64
Annex A (informative) Background information for systems 65
A.1 Wiring information 65
A.2 System architectures 66
A.2.1 General 66
A.2.2 Single master architecture 66
A.2.3 Multi-master architecture with one application controller 67
A.2.4 Multi-master architecture with more than one application controller 68
A.2.5 Multi-master architecture with integrated input device 69
A.2.6 Multi-master architecture with integrated input device and power supply 70
A.3 Collision detection 71
A.4 Timing definition explanations 72
A.4.1 General 72
A.4.2 Receiver timing 72
A.4.3 Transmitter timing 72

A.4.4 Grey areas 73
A.5 Maximum current consumption calculation explanation 73
A.5.1 Single bus power supply 73
A.5.2 Multiple bus power supplies 74
A.5.3 Redundant bus power supplies 75
A.6 Communication layer overview 76
A.6.1 General 76
A.6.2 Physical layer 76
A.6.3 Data link layer 76
A.6.4 Network layer 76
A.6.5 Transport layer 77
A.6.6 Session layer 77
A.6.7 Presentation layer 77
A.6.8 Application layer 77
Bibliography 78
Annex ZA (normative) Normative references to international publications with their corresponding European publications 79

Figure 1 – IEC 62386 graphical overview 8
Figure 2 – System structure example 15
Figure 3 – Communication between bus units (example) 15
Figure 4 – Example of a shared interface 17
Figure 5 – Start up timing example 21
Figure 6 – Maximum signal rise and fall time measurements 24
Figure 7 – Minimum signal rise and fall time measurements 24
Figure 8 – Bus power supply current behaviour 27
Figure 9 – Bus power supply voltage behaviour 27
Figure 10 – Frame example 28
Figure 11 – Bi-phase encoded bits 29
Figure 12 – Bit timing example 30
Figure 13 – Settling time illustration 31
Figure 14 – Receiver timing decision example 33
Figure 15 – Collision detection timing decision example 37
Figure 16 – Collision recovery example 38
Figure 17 – Current rating test signal 56
Figure 18 – Dynamic behaviour test setup 57
Figure 19 – Dynamic behaviour test signal 58
Figure A.1 – Single master architecture example 67
Figure A.2 – Multi-master architecture example with one application controller 68
Figure A.3 – Multi-master architecture example with two application controllers 69
Figure A.4 – Multi-master architecture example with integrated input device 70
Figure A.5 – Multi-master architecture example with integrate input device and bus power supply 71
Figure A.6 – Collision detection timing diagram 72

Figure A.7 – Transmitter and receiver timing illustration....73
Figure A.8 – Bus power supply current values....74
Figure A.9 – Current demand coverage....74
Figure A.10 – Combination of 4 bus power supplies....75
Figure A.11 – Redundant bus power supplies....75

Table 1 – System components....14
Table 2 – Transmitters and receivers in bus units....16
Table 3 – Power-interruption timing of external power....19
Table 4 – Power-interruption timing of bus power....19
Table 5 – Short power interruptions....20
Table 6 – Start-up timing....21
Table 7 – System voltage levels....22
Table 8 – Receiver voltage levels....22
Table 9 – Transmitter voltage levels....23
Table 10 – Current rating....23
Table 11 – Signal rise and fall times....24
Table 12 – Bus power supply output voltage....25
Table 13 – Bus power supply current rating....26
Table 14 – Bus power supply dynamic behaviour....26
Table 15 – Short circuit timing behaviour....28
Table 16 – Transmitter bit timing....31
Table 17 – Transmitter settling time values....31
Table 18 – Receiver timing starting at the beginning of a logical bit....32
Table 19 – Receiver timing starting at an edge inside of a logical bit....32
Table 20 – Receiver settling time values....34
Table 21 – Multi-master transmitter bit timing....35
Table 22 – Multi-master transmitter settling time values....35
Table 23 – Checking a logical bit, starting at an edge at the beginning of the bit....36
Table 24 – Checking a logical bit, starting at an edge inside the bit....37
Table 25 – Collision recovery timing....38
Table 26 – Transmitter command iteration timing....40
Table 27 – Receiver command iteration timing....40
Table 28 – Function call keywords....43
Table 29 – Defined operators....46
Table A.1 – Maximum cable length....66
Table A.2 – OSI layer model of IEC 62386....76