

Contents

| | |
|---|------------|
| I. Introduction | 9 |
| 1. Basic Processes in Converter Connections | 9 |
| 2. The Principles of Semiconductor Valves | 14 |
| 3. Quantities in the Converter Technique, and their Symbols | 26 |
| II. The Idealised Theory of Three Pulse Converters | 29 |
| 1. Steady State Rectifier Operation | 29 |
| 2. Switching-on of a Rectifier with a Resistive-Inductive Load | 33 |
| 3. Converter Transformers | 38 |
| 4. Controlled Converter Operation | 48 |
| 4.1. Rectifier Operation | 48 |
| 4.2. Inverter Operation | 53 |
| 4.3. Discontinuous Operation | 57 |
| 5. The A. C. Line Current of the Converter | 64 |
| 6. The Unsmoothed D. C. Voltage | 70 |
| 7. Phase Control Reactive Power | 73 |
| III. The Conventional Theory of Three Pulse Converters | 78 |
| 1. The Commutation Process | 78 |
| 2. The Load Characteristic up to the Short Circuit Point | 97 |
| 3. Valve Stressing and Inverter Limit | 109 |
| 4. Reactive Power due to Commutation | 114 |
| 5. Switching on of a Rectifier with Commutation Reactances and an Ohmic-Inductive Load | 119 |
| IV. Six Pulse Converters | 127 |
| 1. Midpoint Connection | 127 |
| 2. Interphase Transformer Connection | 136 |
| 3. Three Phase Bridge Connection | 150 |

| | |
|---|-----|
| V. Converter Operation on a Three Phase System | 172 |
| 1. The Effect of Commutation upon the A. C. System Current | 172 |
| 2. Twelve and Higher Multiple Pulse Converters | 177 |
| 3. The Converter on a System with a Finite Short Circuit Capacity | 186 |
| VI. Converters with Reduced Control Reactive Power | 207 |
| 1. Unsymmetrical Control | 207 |
| 2. Sequence Control of Converters | 210 |
| 3. Converter Connections with Free Wheeling Branches | 227 |
| 4. Converters with Condensers in the Commutation Circuits | 234 |
| VII. Two Pulse Converters | 250 |
| 1. Idealised and Conventional Theory | 250 |
| 2. Operation with a Counter Voltage and Finite Inductance in the D. C. Circuit | 263 |
| 3. Two Pulse Converter Connections with Free Wheeling Branches | 275 |
| 4. Example of a Self-Commutated Inverter | 293 |
| VIII. The Converter as an Amplifier | 301 |
| 1. Control Principles | 301 |
| 2. Converters in Control Circuits | 308 |
| IX. Special Converter Combinations | 313 |
| 1. Reversing Converters | 313 |
| 2. Principles of Frequency Conversion | 329 |
| 2.1. Frequency Converters with a D. C. Intermediate Circuit | 329 |
| 2.2. Cycloconverters | 340 |
| Symbols | 349 |
| Bibliography | 351 |
| Index | 355 |