



Safety instructions

WARNING! Obey these instructions, if you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation or maintenance work.

- Keep the drive in its package until you install it. After unpacking, protect the drive from dust, debris and moisture.
- Use the required personal protective equipment, safety shoes with antistatic sole, safety glasses, protective gloves and long sleeves, etc.
- When the drive is connected to equipment, it energizes, do not do work on the drive, input cables, motor, control cables or control circuit.
- Do not do work on the drive when a rotating permanent magnet motor is connected to it. A rotating permanent magnet energizes the drive, including the input power supply terminals.

Electrical safety precautions

- Clearly identify the work location and equipment.
- Disconnect all possible voltage sources. Make sure that reconnection is not possible. Lock out and tag out.
 - Open the main disconnecting device of the drive.
 - If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive.
 - Disconnect any dangerous external voltage from the control circuit.
 - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
- Protect any other energized parts in the work location against contact.

- Take special precautions when close to bare conductors.
- Measure the insulation resistance in the control circuit.
 - Use a multimeter with a minimum impedance of 1 M Ω .
 - Make sure that the voltage between the drive input power terminals (U1, U2, U3) and the ground (PE) is within the 0 V-12 V.
 - Make sure that the voltage between the drive output terminals (D1, D2, D3) and the ground (PE) is close to 0 V.
 - Make sure that the voltage between the drive DC terminals (D4+ and D4-) and the ground (PE) is close to 0 V.
- Install temporary grounding as required by the local regulations.
- Apply the process to control of the electrical installation work for a period to comply.

See the drive user's manual for the complete safety instructions.

1. Examine the installation area

The drive is intended for cabinet installation and has a degree of protection of IP20 (2 M, open type as standard).

Make sure that in the installation area:

- There is sufficient space above and below the drive for cooling, and hot air does not circulate. Refer to the cooling air flow diagram in the user's manual.
- The ambient conditions are suitable. Refer to ambient conditions.
- The mounting surface is non-flammable and can hold the weight of the drive. Refer to the weight data in the user's manual.
- Mounting holes near the drive are non-flammable.
- There are no sources of strong magnetic fields, such as high-current straight-line conductors or conductors with near the drive. A strong magnetic field can cause interference in the operation of the drive.

2. Install the drive

Use the provided drive with screws or for a DIN rail (Type M4, M5 or M6 x 30 + 3.5 mm) (2.4 + 0.3 kg).

- Make sure that there is a minimum of 10 mm (3/8") top air free space above and below the drive for cooling.
- When gluing drives on top of each other in a panel or cabinet, make sure that the hot air from the drives below do not directly enter the drive above.

WARNING! Do not install the drive upside down. Make sure that the cooling air does not get into the cooling air side of the cabinet.

To install the drive with screws

- Cut out the mounting bracket from the enclosure and use it to mark the locations for the mounting holes.
- Mark the location for the mounting screws and install outside plugs or adapters.



1. Short to ground the motor-to-line mounting holes.

2. Place the drive into the mounting screws.

3. Tighten the mounting screws securely.

4. To install the drive to a DIN rail

1. Place the top of the drive onto the DIN mounting rail.

2. Set the drive against the rail.

3. To remove the drive, reverse the above steps in reverse order of the drive.

3. Attach the clamping plates

1. Fasten the clamping plate to the bottom of the drive with the provided screws.

2. Fasten the top clamping plate to the top of the drive with the provided screws.

4. Measure the insulation resistance

Measuring the insulation is typically not required in North America.

Notes: Do not do voltage tolerance or insulation resistance tests on the drive, because this can cause damage to the drive.

Input power cable: Before you connect the input power cable, measure the insulation resistance of the input power cable. Observe the local regulations.

Motor and motor cable:

1. Make sure that the motor cable is connected to the motor and disconnected from the drive output terminals (D1, D2 and D3).

2. Use a voltage of 500V or DC to measure the insulation resistance between each phase conductor and the protective earth conductor. The insulation resistance of an AC motor should be more than 500 M Ω (at 25 °C/77 °F). For the insulation resistance of other motors, refer to the manufacturer's documentation. Measure in the motor because the insulation resistance of any electrical device is higher at lower temperatures. Dry the motor and do the measurement again.

5. Select the cables

Input power cable (AC/DC): IEC/UL 60309-2 requiring three protective earth (ground) conductors. Prefer a symmetrical shielded cable (S/SC) cable. For the best EMC performance and to meet the European EMC requirements.

Control cable: Use a shielded twisted-pair cable for analog signals. Use a shielded twisted-pair cable for digital, relay and I/O signals. Do not mix DC and AC/DC signals in the same cable.

6. Connect the power cables

Connection diagram (shielded cables)

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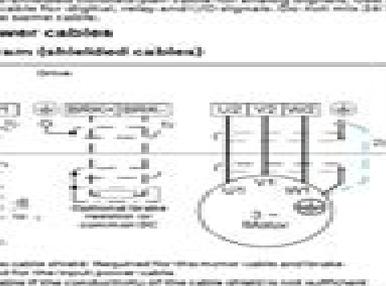
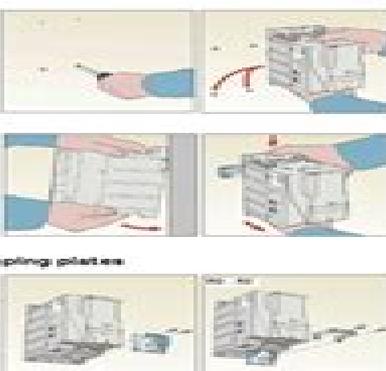
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3. To remove the drive, reverse the above steps in reverse order of the drive.

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Power line	Lightning protection	PE
U1, U2, U3	U1, U2, U3, PE	PE
D1, D2, D3	D1, D2, D3, PE	PE
D4	D4, PE	PE
D5	D5, PE	PE

7. Connect the control cables

Default I/O connections

The diagram shows the I/O connections when parameter 2007 has value 0 (user I/O connections).



Terminal	Function																																																																																					
U1, U2, U3	Input cable phase conductors																																																																																					
U4	Output frequency reference (0...20V)																																																																																					
U5	Driving input circuit common																																																																																					
U6	Reference voltage (0V) DC class 2/3 class																																																																																					
U7	Stop to stop (0V) 0...20V																																																																																					
U8	Driving input circuit common																																																																																					
U9	DC Output frequency value (0...20V)																																																																																					
U10	Driving output circuit common																																																																																					
U11	Auxiliary voltage output (0V) VDC class 2/3 class																																																																																					
U12	Auxiliary voltage output common																																																																																					
U13	Digital input common																																																																																					
U14	U15	U16	U17	U18	U19	U20	U21	U22	U23	U24	U25	U26	U27	U28	U29	U30	U31	U32	U33	U34	U35	U36	U37	U38	U39	U40	U41	U42	U43	U44	U45	U46	U47	U48	U49	U50	U51	U52	U53	U54	U55	U56	U57	U58	U59	U60	U61	U62	U63	U64	U65	U66	U67	U68	U69	U70	U71	U72	U73	U74	U75	U76	U77	U78	U79	U80	U81	U82	U83	U84	U85	U86	U87	U88	U89	U90	U91	U92	U93	U94	U95	U96	U97	U98	U99	U100

U1-U10: Used as a speed reference (0...20V) or as a speed feedback (0...20V) signal. For the best EMC performance, use a shielded twisted-pair cable for analog signals. Use a shielded twisted-pair cable for digital, relay and I/O signals. Do not mix DC and AC/DC signals in the same cable.

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U61-U62: Used as a speed reference

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Jiyuan Zhang



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Computer Safety, Reliability, and Security Rune Winther, Bjoern Axel Gran, Gustav Dahll, 2005-10-10 This book constitutes the refereed proceedings of the 24th International Conference on Computer Safety Reliability and Security SAFECOMP 2005 held in Fredrikstad Norway in September 2005 The 30 revised full papers were carefully reviewed and selected for inclusion in the book The papers address all aspects of dependability and survivability of critical computerized systems in various branches and infrastructures

Plant Intelligent Automation and Digital Transformation Swapan Basu, 2022-10-28 Plant Intelligent Automation and Digital Transformation Process and Factory Automation is an expansive four volume collection reviewing every major aspect of the intelligent automation and digital transformation of power process and manufacturing plants from the specific control and automation systems pertinent to various power process plants through manufacturing and factory automation systems This volume introduces the foundations of automation control theory networking practices and communication for power process and manufacturing plants considered as integrated digital systems In addition it discusses Distributed control System DCS for Closed loop controls system CLCS and PLC based systems for Open loop control systems OLCS and factory automation This book provides in depth guidance on functional and design details pertinent to each of the control types referenced above along with the installation and commissioning of control systems Introduces the foundations of control systems networking and industrial data communications for power process and manufacturing plant automation Reviews core functions design details and optimized configurations of plant digital control systems Addresses advanced process control for digital control systems inclusive of software implementations Provides guidance for installation commissioning of control systems in working plants

Plant Intelligent Automation and Digital Transformation Volume II Swapan Basu, 2024-08-11 Plant Intelligent Automation and Digital Transformation Volume II Control and Monitoring Hardware and Software is an expansive four volume collection that reviews every major aspect of the intelligent automation and digital transformation of power process and manufacturing plants including specific control and automation systems pertinent to various power process plants using manufacturing and factory automation systems The book reviews the key role of management Information systems MIS HMI and alarm systems in plant automation in systemic digitalization covering hardware and software implementations for embedded microcontrollers FPGA and operator and engineering stations Chapters address plant lifecycle considerations inclusive of plant hazards and risk analysis Finally the book discusses industry 4.0 factory automation as a component of digitalization strategies as well as digital transformation of power plants process plants and manufacturing industries Reviews supervisory control and data acquisitions SCADA systems for real time plant data analysis Provides practitioner perspectives on operational implementation including human machine interface operator workstation and engineering workstations Covers alarm and alarm management systems including lifecycle considerations Fully covers risk analysis and assessment including safety

lifecycle and relevant safety instrumentation

Plant Flow Measurement and Control Handbook Swapan

Basu,2018-08-22 Plant Flow Measurement and Control Handbook is a comprehensive reference source for practicing engineers in the field of instrumentation and controls It covers many practical topics such as installation maintenance and potential issues giving an overview of available techniques along with recommendations for application In addition it covers available flow sensors such as automation and control The author brings his 35 years of experience in working in instrumentation and control within the industry to this title with a focus on fluid flow measurement its importance in plant design and the appropriate control of processes The book provides a good balance between practical issues and theory and is fully supported with industry case studies and a high level of illustrations to assist learning It is unique in its coverage of multiphase flow solid flow process connection to the plant flow computation and control Readers will not only further understand design but they will also further comprehend integration tactics that can be applied to the plant through a step by step design process that goes from installation to operation Provides specification sheets engineering drawings calibration procedures and installation practices for each type of measurement Presents the correct flow meter that is suitable for a particular application Includes a selection table and step by step guide to help users make the best decision Cover examples and applications from engineering practice that will aid in understanding and application [Document Image Processing](#)

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Countering Cyber Sabotage Andrew A. Bochman,Sarah Freeman,2021-01-19

Countering Cyber Sabotage

Introducing Consequence Driven Cyber Informed Engineering CCE introduces a new methodology to help critical infrastructure owners operators and their security practitioners make demonstrable improvements in securing their most important functions and processes Current best practice approaches to cyber defense struggle to stop targeted attackers from creating potentially catastrophic results From a national security perspective it is not just the damage to the military the economy or essential critical infrastructure companies that is a concern It is the cumulative downstream effects from potential regional blackouts military mission kills transportation stoppages water delivery or treatment issues and so on CCE is a validation that engineering first principles can be applied to the most important cybersecurity challenges and in so doing protect organizations in ways current approaches do not The most pressing threat is cyber enabled sabotage and CCE begins with the assumption that well resourced adaptive adversaries are already in and have been for some time undetected and perhaps undetectable Chapter 1 recaps the current and near future states of digital technologies in critical infrastructure and the implications of our near total dependence on them Chapters 2 and 3 describe the origins of the methodology and set the stage for the more in depth examination that follows Chapter 4 describes how to prepare for an engagement and chapters 5 8 address each of the four phases The CCE phase chapters take the reader on a more granular walkthrough of the methodology with examples from the field phase objectives and the steps to take in each phase Concluding chapter 9 covers training options and looks towards a future where these concepts are scaled more broadly **Perspectives in Business**

Informatics Research Rébecca Deneckère, Marite Kirikova, Janis Grabis, 2025-09-09 This book constitutes the proceedings of the 24th International Conference on Perspectives in Business Informatics Research BIR 2025 which took place in Riga Latvia in September 2025 The central theme of BIR 2025 was Bridging Knowledge Process and Systems for Responsible Digital Transformation The 18 full papers and 5 short papers included in the proceedings were carefully reviewed and selected from 61 submissions They were organized in topical sections as follows Intelligent Decision Making and Data Management Human Factors and Well Being in Digital Systems Enterprise Architecture Modeling and Governing Adaptive Organizations Process Mining and Digital Twin Perspectives LLM and Generative AI in Modeling and Engineering Smart Life and Structuring Security for Responsible Digital Systems Modern Technologies in Industrial Engineering Constantin Carausu, Viorel Cohal, Ioan Doroftei, Andrzej Wróbel, Dumitru Nedelcu, 2013-11-08 Selected peer reviewed papers from the ModTech International Conference on Modern Technologies in Industrial Engineering ModTech 2013 June 27 29 2013 Sinaia Romania **Title List of Documents Made Publicly Available**, 1995 *Control Engineering*, 1992 Instrumentation and automatic control systems *Proceedings of the Sixteenth Reactor Operations International Topical Meeting*, 1993

Robotics Abstracts, 1990 *Evaluating Practice* Martin Bloom, Joel Fischer, John G. Orme, 2006 Clearly presents all aspects of evaluation for human services including conceptualization measurement design and analysis Focusing on single system designs this text presents clear and user friendly guidelines on conceptualizing and measuring problems developing practice oriented evaluation designs understanding and analyzing data and ethical guidelines for practice evaluation Specifically written for students and practitioners in all the human services including social work psychology counseling nursing and psychiatry *TopFuel'97*, 1997 Volume 1 1 Market and fuel cycle economics 2 Advanced fuel design and materials 3 Fuel manufacturing and transportation 4 Recycled uranium and MOX fuel technologies Volume 2 5 Fuel management and performance Aldus Datebook Pro & Aldus Touchbase Pro, 1993 *Proceedings*, 1997

Hydrocarbon Processing, 2009 September 1 2021 Since 1922 management and technical professionals from petroleum refining gas processing petrochemical chemical and engineer constructor companies throughout the world have turned to Hydrocarbon Processing for high quality technical and operating information Through its monthly magazine website and e newsletters Hydrocarbon Processing covers technological advances processes and optimization developments from throughout the global Hydrocarbon Processing Industry HPI Hydrocarbon Processing editors and writers provide real world case studies and practical information that readers can use to improve their companies operations and their own professional job skills taken from publisher web site **The Solicitors' Journal and Weekly Reporter**, 1912 **Scientific and Technical Organizations and Agencies Directory** Peter D. Dresser, 1994 **Daily Report**, 1995

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<https://db1.greenfirefarms.com/About/Resources/default.aspx/Quick%20Side%20Hustles%20Usa%2031847%2070511%20109175.pdf>

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