Training Center Robotics
Training for ABB robots and application engineering

This document contains the current training programme 2013, and other useful information.

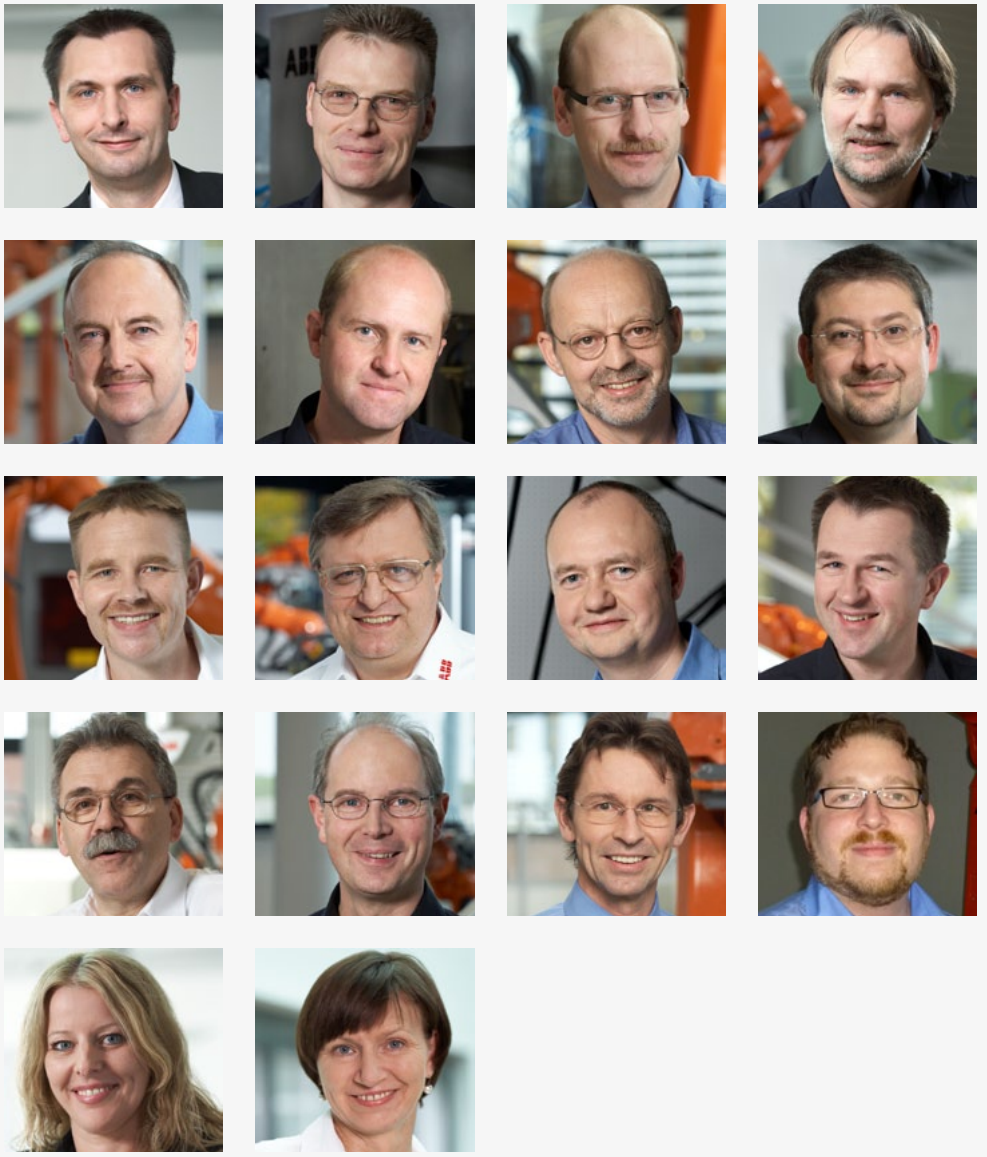
As much theory as necessary – as much practice as possible!

Qualified specialists are becoming increasingly important for the success of a company. Our training programme is designed to give your employees as much theory as necessary and as much practice as possible to make them fit for the future. Your employees will be one of the vital factors for remaining competitive and ensuring sustainable management in the future.

Development plays a key role at ABB. In addition to the further development and qualification of our trainers, we have invested a lot of energy in new training concepts and improving their presentation. Our goal is to assist you in selecting the best possible training program for you and your employees and to offer the best possible support along the way.

Ideally, training and education should not simply be rescheduled measure for measure. It should rather be an ongoing process to ensure long-term and continuous development. Our new presentation attempts to make it easier for you to define and create a long-term training plan. We would be happy to discuss this with you in person to devise individual concepts best suited to your needs.

We look forward to meeting you!

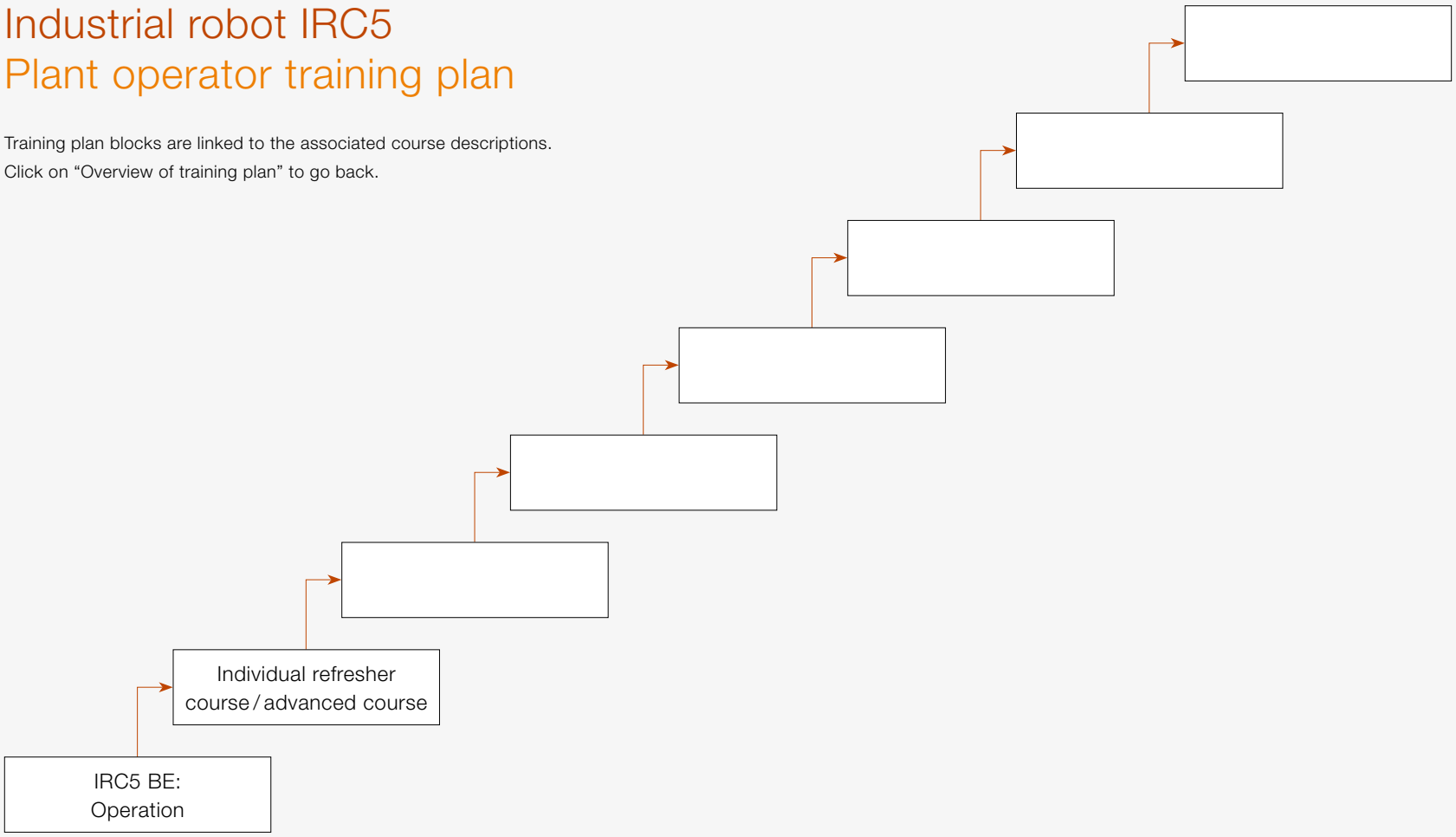


Our Training Center

Overview

Industrial robot IRC5
Plant operator training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 BE: Operation

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,250 EUR / participant

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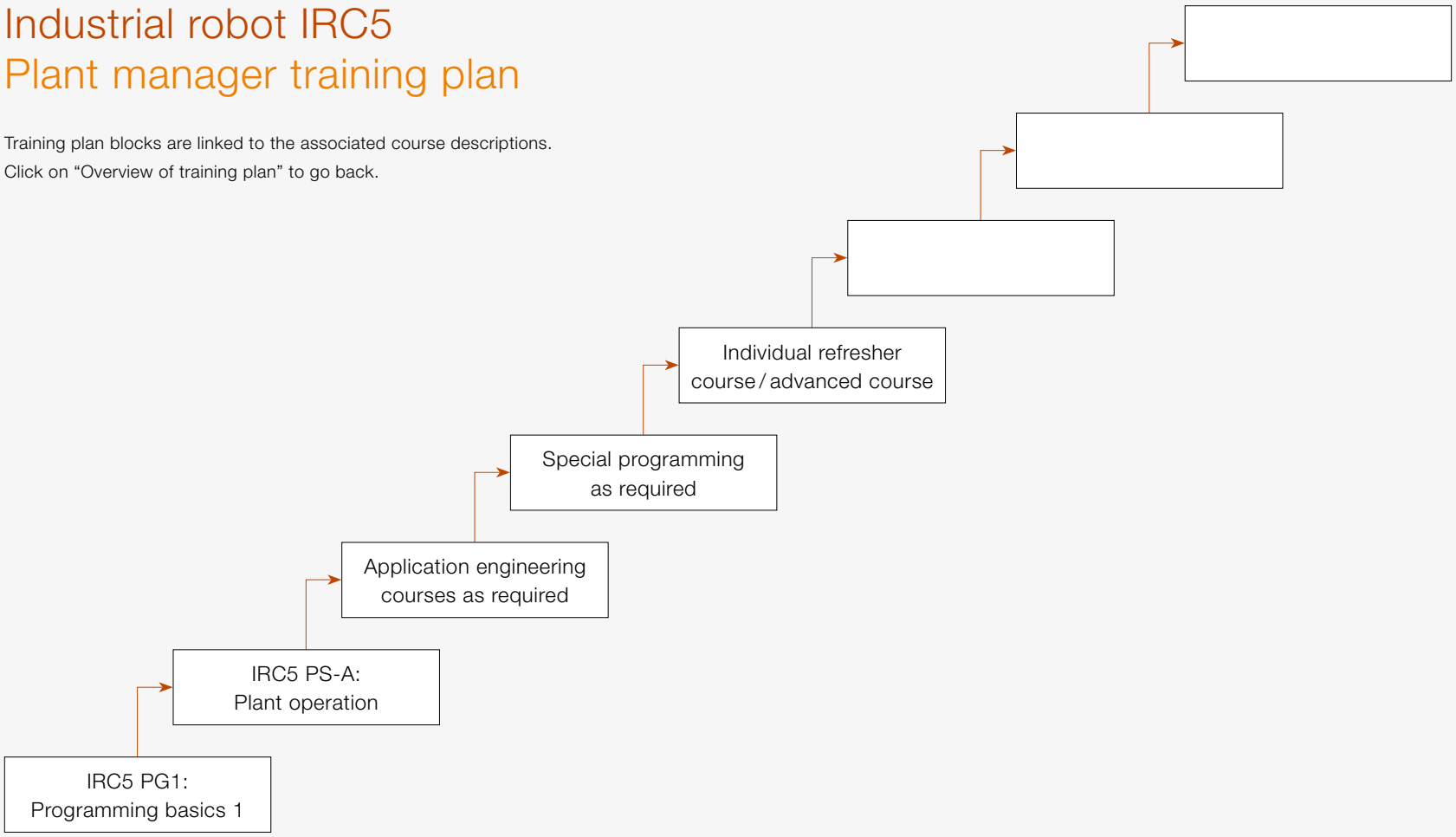
Overview of training plan
1. **IRC5 BE: Operation**
2. Individual refresher course / advanced course

Industrial robot IRC5
Plant manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **IRC5 PG1: Programming basics 1**
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 PS-A: Plant operation

Target group
Plant managers who configure, adapt or optimise programmes in existing systems

Course goals
- Understand programme execution, functionality and RAPID solution
- Measure cycle time and motion as well as optimise I/O monitoring
- Configure the system in RobotStudio in order to conduct offline tests and optimisation

Contents
- Occupational health and safety
- Backup
- RobotStudio used with own applications
- Increasing programming knowledge (RAPID declaration)
- Functional monitoring: robots and coordinate systems
- Basics of motion optimisation: measure cycle time, ergonomic movement type and setting
- Motion and I/O control: Save cycle time with triggering
- Configurations: examples of parameter adjustments
- Programme structure: modularity, local declarations, model management

Prerequisites
- Participation in the PG 1 basic course for the respective control generation
- Advanced computer skills
- If possible, bring your own computer and your own system backup

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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1. IRC5 PG1: Programming basics 1
2. **IRC5 PS-A: Plant operation**
3. Application engineering courses as required
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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4. Special programming as required
5. Individual refresher course / advanced course

IRC5 APT-KS: Adhesion Sealing

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Independently developing, implementing, testing, optimising and documenting simple adhesion and seam sealing programs
- Changing and/or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software DispenseWare
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Programming adhesive seams
- Evaluating seam results

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 1,300 EUR/participant

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3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course/advanced course

IRC5 APT-KS-IPS: Adhesion and sealing – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling application processes; maintaining, configuring and extending the control system
- Independently developing, implementing, testing, optimising and documenting simple application programs
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application “Integrated Dispensing Function Pac”
- Getting to know and applying application related data types, instructions and software commands
- Programming adhesive seams
- Evaluating and optimising seam results
- Architecture of the “IntegratedProzessSystem”
- Explaining and understanding IPS configurations
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Backup and diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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4. Special programming as required
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IRC5 APT-P: Spot welding

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated spot welding tongs
- Setting up spot welding tongs on the IRB
- Teaching basic skills on the structure and process in a spot welding plant
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- Teaching the application software SpotWare
- Connecting the welding controls to the controls of the robot system
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Adjusting application related system parameters
- Tong measurement
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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2. IRC5 PS-A: Plant operation
3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 APT-RB: Roller beading

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated roller beading tool
- Setting up a roll beading tool on the IRB
- Teaching basic skills on the structure and process in a roll beading application
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- How the system works
- Adjusting application related system parameters
- Getting to know and applying application related instructions and software commands
- Discussing RH system modules
- Performing RH calibration
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
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2. IRC5 PS-A: Plant operation
3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 APT-S1: Shielded arc welding 1

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Making changes to the application
- Making weld seams

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software ArcWare
- Using the ABB-Production-Manager
- Getting to know and applying application related instructions and software commands
- Programming weld seams with predefined welding data
- Correcting weld seams

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 APT-S2: Shielded arc welding 2

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- The independent programming of a welding plant
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Safety with robot welding plants
- Occupational health and safety of inert gas welding
- Adjusting application related system parameters
- Systematic structure of a welding program with observation of the programming guidelines
- Definition of seam, pendulum and welding data
- Programming weld seams
- Programming with external axes
- Troubleshooting the welding program
- Error diagnostics in the welding program
- Automatic TCP measurement and monitoring
- Basics of the different types of arcs
- Welding with different material strengths
- Documenting the welding routines

Prerequisites
- Participation in the application course on Inert gas welding 1
- Arc welding skills
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course / advanced course

IRC5 PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with material handling synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS card
- Creating the system prerequisites for the operation of EPS
- Configuration of the EPS card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS: Card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches and SafeMove

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS and SafeMove cards
- Creating the system prerequisites for the operation of EPS and SafeMove
- Configuration of the EPS and SafeMove cards

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Mechanical installation and electrical integration of the SafeMove card
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-HPR: HomePosRunning

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the HomePosRunning option
- Definition and secure storage of the machined parts with the HomePosRunning functionality

Contents
- Occupational health and safety
- Producing a system with the HomePosRunning option
- Functionality and operation of HomePosRunning
- Writing a program whilst taking into account the HomePosRunning functionality
- Getting to know and applying application relating instructions and functions
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-FCM: Force Control for Machining

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the Force Control for Machining option
- Getting to know the functionality of the force-controlled process regulation on the machined part

Contents
- Occupational health and safety
- Producing a system with the Force Control for Machining option with the help of the Graphical User Interface (GUI)
- Getting to know and using the graphical user interface
- Aligning the machined part with the force-controlled process regulation
- Getting to know and applying application relating instructions and functions
- Programming the application processes – force-controlled process and speed-controlled process
- Assembly basics

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-S: SafeMove

Target group
Planners, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the SafeMove card
- Creating the system prerequisites for the operation of SafeMove
- Configuration of the SafeMove card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the SafeMove card
- Connecting an initiator
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-MMV-K: MultiMove – Configuration

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Getting to know the functionality of MultiMove
- Commissioning new MultiMove systems
- Measuring the associated coordinate systems

Contents
- Occupational health and safety
- Structure of the hardware
- Producing a system with the MultiMove option
- Functional monitoring of all components
- Calibrating measurement systems
- Testing the functions of “Synchronised and coordinated movements”
- Getting to know measurement methods for tool / plant object and basic coordinates
- Applying measurement routines
- System parameters and backup

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-MMV-P: MultiMove – Programming

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Performing programming tasks on a configured MultiMove application
- Moving and monitoring the coordinate systems
- Writing movement programs (independent, synchronous, coordinated)
- Special MMV declarations
- The significance and application of MMV instructions
- Examples of program structure / controlling for all tasks

Contents
- Occupational health and safety
- Understanding the movement of the IRB in an MMV system
- Tasks- Loading / Editing / Starting up / Saving
- Independent movements
- Synchronised movements
- Synchronised and coordinated movements
- Controlling the movement task by an additional task
- Special features for coordinated movements / error response
- Task distribution options via an administration task
- Backup
- Programming tracks
- Programming new machined parts

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-PM: PickMaster 3

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out the electrical and mechanical commissioning of the robot system
- Knowing the basic functions of PickMaster
- Connecting material handling technology to the robot system
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- System structure
- Installation of the PickMaster software
- Structure and wiring of a PickMaster system
- Structure of the robot programs
- Defining lines and projects
- Calibrating the camera
- Calibrating material handling technology
- PLC connection
- Backing up the whole system

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons per company
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 9,600 EUR / course with a maximum of 3 persons per company

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3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-XP: Programming external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-A: Plant operation
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

IRC5 PS-X: Programming and configuring external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Commissioning an external axis
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Functioning of all components and error diagnostics
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Circuit diagrams, connection variants
- Booting for external axes
- Rectifiers, driver stages, motor units for external axes
- Carrying out configurations and system parameters based on defined specifications
- Fine-tuning the server control by recording its regular behaviour
- Special features such as external transmissions, IndependentMove
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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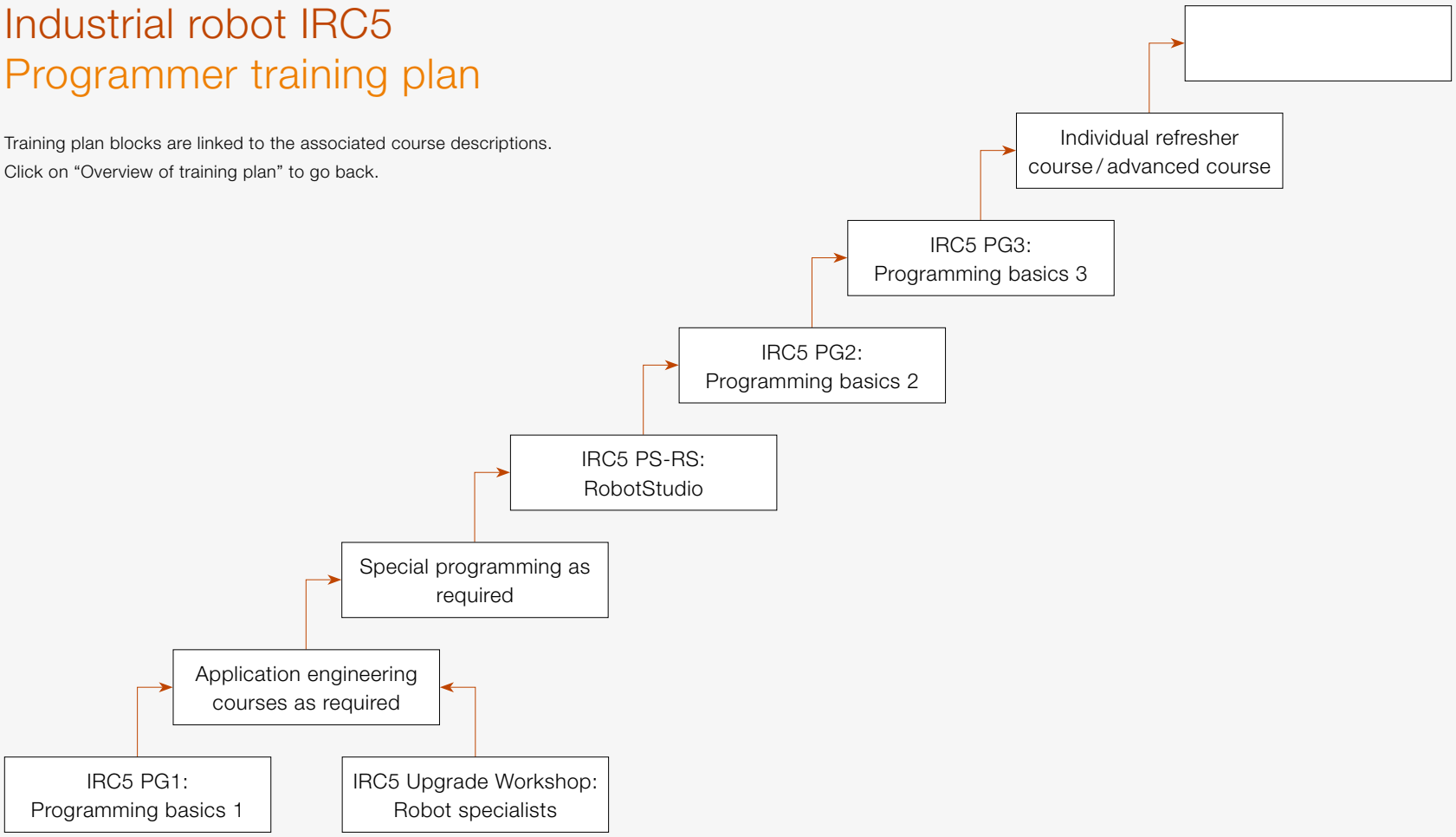
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

Industrial robot IRC5
Programmer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **IRC5 PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 Upgrade Workshop: Robot specialists

Target group
– Robot specialists

Course goals
– Advanced programming skills
– Gaining the prerequisites to attend IRC5 PG3

Contents
– Occupational health and safety
– Main topics from basic courses IRC5 PG1 and PG2
– Prioritization of topics at the start of training
– Perform contents individually
– Consideration and deeper examination of know issues in-and-around IRC5

Prerequisites
– Robot controller expert
– Several years of experience in robotic installation, commissioning and programming
– Sound computer skills

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5 Upgrade Workshop: Robot specialists**
2. Application engineering courses as required
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG3: Programming basics 3
6. Individual refresher course / advanced course

IRC5 APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 APT-KS: Adhesion Sealing

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Independently developing, implementing, testing, optimising and documenting simple adhesion and seam sealing programs
- Changing and/or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software DispenseWare
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Programming adhesive seams
- Evaluating seam results

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 1,300 EUR/participant

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Overview of training plan
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2. **Application engineering courses as required**
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4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course/advanced course

IRC5 APT-KS-IPS: Adhesion and sealing – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling application processes; maintaining, configuring and extending the control system
- Independently developing, implementing, testing, optimising and documenting simple application programs
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application “Integrated Dispensing Function Pac”
- Getting to know and applying application related data types, instructions and software commands
- Programming adhesive seams
- Evaluating and optimising seam results
- Architecture of the “IntegratedProzessSystem”
- Explaining and understanding IPS configurations
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Backup and diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 APT-P: Spot welding

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated spot welding tongs
- Setting up spot welding tongs on the IRB
- Teaching basic skills on the structure and process in a spot welding plant
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- Teaching the application software SpotWare
- Connecting the welding controls to the controls of the robot system
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Adjusting application related system parameters
- Tong measurement
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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2. **Application engineering courses as required**
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 APT-RB: Roller beading

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated roller beading tool
- Setting up a roll beading tool on the IRB
- Teaching basic skills on the structure and process in a roll beading application
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- How the system works
- Adjusting application related system parameters
- Getting to know and applying application related instructions and software commands
- Discussing RH system modules
- Performing RH calibration
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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2. **Application engineering courses as required**
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 APT-S1: Shielded arc welding 1

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Making changes to the application
- Making weld seams

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software ArcWare
- Using the ABB-Production-Manager
- Getting to know and applying application related instructions and software commands
- Programming weld seams with predefined welding data
- Correcting weld seams

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 APT-S2: Shielded arc welding 2

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- The independent programming of a welding plant
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Safety with robot welding plants
- Occupational health and safety of inert gas welding
- Adjusting application related system parameters
- Systematic structure of a welding program with observation of the programming guidelines
- Definition of seam, pendulum and welding data
- Programming weld seams
- Programming with external axes
- Troubleshooting the welding program
- Error diagnostics in the welding program
- Automatic TCP measurement and monitoring
- Basics of the different types of arcs
- Welding with different material strengths
- Documenting the welding routines

Prerequisites
- Participation in the application course on Inert gas welding 1
- Arc welding skills
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with material handling synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
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2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS card
- Creating the system prerequisites for the operation of EPS
- Configuration of the EPS card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS: Card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches and SafeMove

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS and SafeMove cards
- Creating the system prerequisites for the operation of EPS and SafeMove
- Configuration of the EPS and SafeMove cards

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Mechanical installation and electrical integration of the SafeMove card
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-HPR: HomePosRunning

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the HomePosRunning option
- Definition and secure storage of the machined parts with the HomePosRunning functionality

Contents
- Occupational health and safety
- Producing a system with the HomePosRunning option
- Functionality and operation of HomePosRunning
- Writing a program whilst taking into account the HomePosRunning functionality
- Getting to know and applying application relating instructions and functions
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-I: Initiation

Target group
Start-up engineers, programmers

Course goals
- For course IRC5 PS-I (Commissioning), tips will be provided for building a new system and the operating system for the controls will be installed
- The participant will use RobotStudio (online functionality) more
- Topics that are only briefly addressed in the course (e.g. system parameters) are independently practised by the participants with the help of the documentation
- Installation of the robot software on the participant's own computer

Contents
- Occupational health and safety
- Explaining programming regulations in accordance with ABB standards
- Programming branches and loops
- System parameters: Meaning, change, backup
- Circuit diagrams (security and I/O signals)
- Producing a system, installation of the control software
- Converting process descriptions into functional solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Own computer
- Administrator rights for installing programs
- Electrical expert

Information
Course duration: 4 days
Number of participants: 3–6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 2,300 EUR/participant

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Overview of training plan
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2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course/advanced course

IRC5 PS-FCM: Force Control for Machining

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the Force Control for Machining option
- Getting to know the functionality of the force-controlled process regulation on the machined part

Contents
- Occupational health and safety
- Producing a system with the Force Control for Machining option with the help of the Graphical User Interface (GUI)
- Getting to know and using the graphical user interface
- Aligning the machined part with the force-controlled process regulation
- Getting to know and applying application relating instructions and functions
- Programming the application processes – force-controlled process and speed-controlled process
- Assembly basics

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
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3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-S: SafeMove

Target group
Planners, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the SafeMove card
- Creating the system prerequisites for the operation of SafeMove
- Configuration of the SafeMove card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the SafeMove card
- Connecting an initiator
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
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2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-MMV-K: MultiMove – Configuration

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Getting to know the functionality of MultiMove
- Commissioning new MultiMove systems
- Measuring the associated coordinate systems

Contents
- Occupational health and safety
- Structure of the hardware
- Producing a system with the MultiMove option
- Functional monitoring of all components
- Calibrating measurement systems
- Testing the functions of “Synchronised and coordinated movements”
- Getting to know measurement methods for tool / plant object and basic coordinates
- Applying measurement routines
- System parameters and backup

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-MMV-P: MultiMove – Programming

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Performing programming tasks on a configured MultiMove application
- Moving and monitoring the coordinate systems
- Writing movement programs (independent, synchronous, coordinated)
- Special MMV declarations
- The significance and application of MMV instructions
- Examples of program structure / controlling for all tasks

Contents
- Occupational health and safety
- Understanding the movement of the IRB in an MMV system
- Tasks- Loading / Editing / Starting up / Saving
- Independent movements
- Synchronised movements
- Synchronised and coordinated movements
- Controlling the movement task by an additional task
- Special features for coordinated movements / error response
- Task distribution options via an administration task
- Backup
- Programming tracks
- Programming new machined parts

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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2. Application engineering courses as required
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6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-PM: PickMaster 3

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out the electrical and mechanical commissioning of the robot system
- Knowing the basic functions of PickMaster
- Connecting material handling technology to the robot system
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- System structure
- Installation of the PickMaster software
- Structure and wiring of a PickMaster system
- Structure of the robot programs
- Defining lines and projects
- Calibrating the camera
- Calibrating material handling technology
- PLC connection
- Backing up the whole system

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons per company
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 9,600 EUR / course with a maximum of 3 persons per company

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2. Application engineering courses as required
3. **Special programming as required**
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-XP: Programming external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-X: Programming and configuring external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Commissioning an external axis
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Functioning of all components and error diagnostics
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Circuit diagrams, connection variants
- Booting for external axes
- Rectifiers, driver stages, motor units for external axes
- Carrying out configurations and system parameters based on defined specifications
- Fine-tuning the server control by recording its regular behaviour
- Special features such as external transmissions, IndependentMove
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
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2. Application engineering courses as required
3. Special programming as required
4. **IRC5 PS-RS: RobotStudio**
5. IRC5 PG2: Programming basics 2
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PG2: Programming basics 2

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Operating and learning the editing and testing options on the robot in RobotStudio (online functionality) and with the virtual control
- The application of a programming tool for editing and testing programs on the computer

Contents
- Occupational health and safety
- Using the extended set of commands and optional arguments
- Producing and using your own routines and modules
- Programming your own instructions and functions
- System parameters (use of the system signals, password protection, etc.)
- Troubleshooting and interrupt programming
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Local, global and routine data
- Writing programs on the computer (offline and online)

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,050 EUR / participant

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Overview of training plan
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2. Application engineering courses as required
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. **IRC5 PG2: Programming basics 2**
6. IRC5 PG3: Programming basics 3
7. Individual refresher course / advanced course

IRC5 PG3: Programming basics 3

Target group
Programmers, procedural developers, start-up engineers

Course goals
- Production and application of complex instructions and programming techniques
- Use of extended programming functions

Contents
- Occupational health and safety
- Changing compiled data elements
- Dynamic access of data elements
- Integrating instructions you have written yourself
- Programming world zones for surveying the working area and defining home zones
- Extended interrupt applications
- Automatic loading and saving of modules
- Processing strings
- Dynamic routine access / late connection
- Extended troubleshooting / error numbers you have written yourself
- Producing log files, writing data in the log file
- Measuring clock intervals
- Data types you have written yourself
- Arrays
- Calculating intermediate positions from teached positions
- Search and reflect functions
- Adjusting system parameters

Prerequisites
- Participation in the course on Programming basics 2 or the IRC5 Upgrade workshop
- Advanced computer skills
- Programming experience with IRC5 control and RobotStudio (online functionality)

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,150 EUR / participant

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Overview of training plan
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2. Application engineering courses as required
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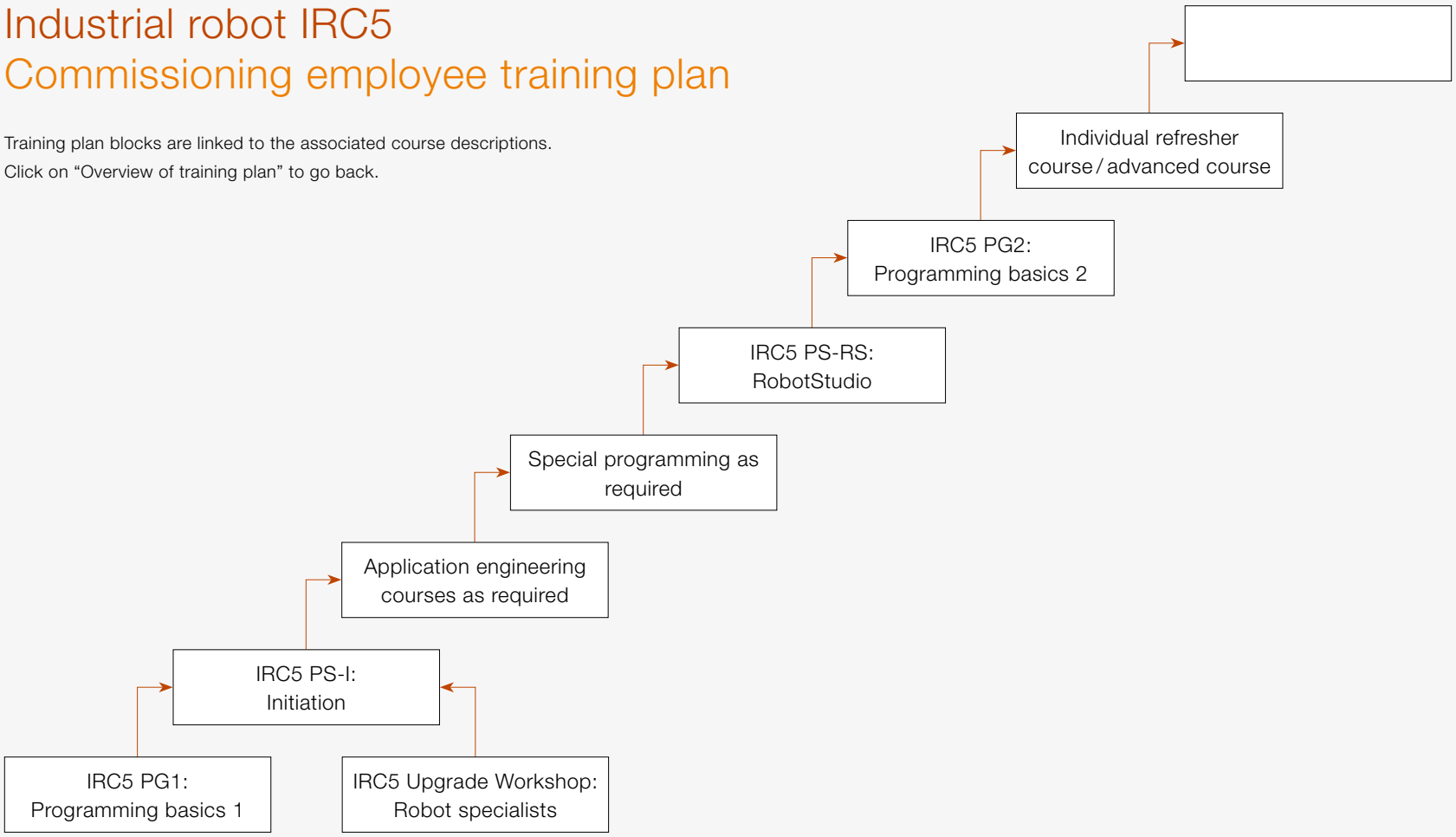
4. IRC5 PS-RS: RobotStudio
5. IRC5 PG2: Programming basics 2
6. **IRC5 PG3: Programming basics 3**
7. Individual refresher course / advanced course

Industrial robot IRC5
Commissioning employee training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **IRC5 PG1: Programming basics 1**
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 Upgrade Workshop: Robot specialists

Target group
– Robot specialists

Course goals
– Advanced programming skills
– Gaining the prerequisites to attend IRC5 PG3

Contents
– Occupational health and safety
– Main topics from basic courses IRC5 PG1 and PG2
– Prioritization of topics at the start of training
– Perform contents individually
– Consideration and deeper examination of know issues in-and-around IRC5

Prerequisites
– Robot controller expert
– Several years of experience in robotic installation, commissioning and programming
– Sound computer skills

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5 Upgrade Workshop: Robot specialists**
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. Individual refresher course / advanced course

IRC5 PS-I: Initiation

Target group
Start-up engineers, programmers

Course goals
- For course IRC5 PS-I (Commissioning), tips will be provided for building a new system and the operating system for the controls will be installed
- The participant will use RobotStudio (online functionality) more
- Topics that are only briefly addressed in the course (e.g. system parameters) are independently practised by the participants with the help of the documentation
- Installation of the robot software on the participant's own computer

Contents
- Occupational health and safety
- Explaining programming regulations in accordance with ABB standards
- Programming branches and loops
- System parameters: Meaning, change, backup
- Circuit diagrams (security and I/O signals)
- Producing a system, installation of the control software
- Converting process descriptions into functional solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Own computer
- Administrator rights for installing programs
- Electrical expert

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **IRC5 PS-I: Initiation**
3. Application engineering courses as required
4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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2. IRC5 PS-I: Initiation
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4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-KS: Adhesion Sealing

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Independently developing, implementing, testing, optimising and documenting simple adhesion and seam sealing programs
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software DispenseWare
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Programming adhesive seams
- Evaluating seam results

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-KS-A: Adhesion Sealing – Application

Target group
Mechanical servicing employee, application mechanic

Course goals
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application "Integrated Dispensing Function Pac"
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Carrying out maintenance and repairs on SPA400 / SPA410
- Carrying out maintenance and repairs on the dosing device
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding the relevant maintenance instructions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-KS-IPS: Adhesion and sealing – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling application processes; maintaining, configuring and extending the control system
- Independently developing, implementing, testing, optimising and documenting simple application programs
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application “Integrated Dispensing Function Pac”
- Getting to know and applying application related data types, instructions and software commands
- Programming adhesive seams
- Evaluating and optimising seam results
- Architecture of the “IntegratedProzessSystem”
- Explaining and understanding IPS configurations
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Backup and diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
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4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-P: Spot welding

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated spot welding tongs
- Setting up spot welding tongs on the IRB
- Teaching basic skills on the structure and process in a spot welding plant
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- Teaching the application software SpotWare
- Connecting the welding controls to the controls of the robot system
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Adjusting application related system parameters
- Tong measurement
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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2. IRC5 PS-I: Initiation
3. **Application engineering courses as required**
4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-RB: Roller beading

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated roller beading tool
- Setting up a roll beading tool on the IRB
- Teaching basic skills on the structure and process in a roll beading application
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- How the system works
- Adjusting application related system parameters
- Getting to know and applying application related instructions and software commands
- Discussing RH system modules
- Performing RH calibration
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-S1: Shielded arc welding 1

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Making changes to the application
- Making weld seams

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software ArcWare
- Using the ABB-Production-Manager
- Getting to know and applying application related instructions and software commands
- Programming weld seams with predefined welding data
- Correcting weld seams

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 APT-S2: Shielded arc welding 2

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- The independent programming of a welding plant
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Safety with robot welding plants
- Occupational health and safety of inert gas welding
- Adjusting application related system parameters
- Systematic structure of a welding program with observation of the programming guidelines
- Definition of seam, pendulum and welding data
- Programming weld seams
- Programming with external axes
- Troubleshooting the welding program
- Error diagnostics in the welding program
- Automatic TCP measurement and monitoring
- Basics of the different types of arcs
- Welding with different material strengths
- Documenting the welding routines

Prerequisites
- Participation in the application course on Inert gas welding 1
- Arc welding skills
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with material handling synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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3. Application engineering courses as required
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5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS card
- Creating the system prerequisites for the operation of EPS
- Configuration of the EPS card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS: Card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches and SafeMove

Target group

Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals

- Mechanical / Electrical integration of the EPS and SafeMove cards
- Creating the system prerequisites for the operation of EPS and SafeMove
- Configuration of the EPS and SafeMove cards

Contents

- Occupational health and safety
- Mechanical installation and electrical integration of the EPS card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Mechanical installation and electrical integration of the SafeMove card
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites

- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information

Course duration: 4 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan

1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-HPR: HomePosRunning

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the HomePosRunning option
- Definition and secure storage of the machined parts with the HomePosRunning functionality

Contents
- Occupational health and safety
- Producing a system with the HomePosRunning option
- Functionality and operation of HomePosRunning
- Writing a program whilst taking into account the HomePosRunning functionality
- Getting to know and applying application relating instructions and functions
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-FCM: Force Control for Machining

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the Force Control for Machining option
- Getting to know the functionality of the force-controlled process regulation on the machined part

Contents
- Occupational health and safety
- Producing a system with the Force Control for Machining option with the help of the Graphical User Interface (GUI)
- Getting to know and using the graphical user interface
- Aligning the machined part with the force-controlled process regulation
- Getting to know and applying application relating instructions and functions
- Programming the application processes – force-controlled process and speed-controlled process
- Assembly basics

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-S: SafeMove

Target group
Planners, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the SafeMove card
- Creating the system prerequisites for the operation of SafeMove
- Configuration of the SafeMove card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the SafeMove card
- Connecting an initiator
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-MMV-K: MultiMove – Configuration

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Getting to know the functionality of MultiMove
- Commissioning new MultiMove systems
- Measuring the associated coordinate systems

Contents
- Occupational health and safety
- Structure of the hardware
- Producing a system with the MultiMove option
- Functional monitoring of all components
- Calibrating measurement systems
- Testing the functions of “Synchronised and coordinated movements”
- Getting to know measurement methods for tool / plant object and basic coordinates
- Applying measurement routines
- System parameters and backup

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-MMV-P: MultiMove – Programming

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Performing programming tasks on a configured MultiMove application
- Moving and monitoring the coordinate systems
- Writing movement programs (independent, synchronous, coordinated)
- Special MMV declarations
- The significance and application of MMV instructions
- Examples of program structure / controlling for all tasks

Contents
- Occupational health and safety
- Understanding the movement of the IRB in an MMV system
- Tasks- Loading / Editing / Starting up / Saving
- Independent movements
- Synchronised movements
- Synchronised and coordinated movements
- Controlling the movement task by an additional task
- Special features for coordinated movements / error response
- Task distribution options via an administration task
- Backup
- Programming tracks
- Programming new machined parts

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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Overview of training plan
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2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-PM: PickMaster 3

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out the electrical and mechanical commissioning of the robot system
- Knowing the basic functions of PickMaster
- Connecting material handling technology to the robot system
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- System structure
- Installation of the PickMaster software
- Structure and wiring of a PickMaster system
- Structure of the robot programs
- Defining lines and projects
- Calibrating the camera
- Calibrating material handling technology
- PLC connection
- Backing up the whole system

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons per company
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 9,600 EUR / course with a maximum of 3 persons per company

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Overview of training plan
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2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-XP: Programming external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-X: Programming and configuring external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Commissioning an external axis
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Functioning of all components and error diagnostics
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Circuit diagrams, connection variants
- Booting for external axes
- Rectifiers, driver stages, motor units for external axes
- Carrying out configurations and system parameters based on defined specifications
- Fine-tuning the server control by recording its regular behaviour
- Special features such as external transmissions, IndependentMove
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. **Special programming as required**
5. IRC5 PS-RS: RobotStudio
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. Special programming as required
5. **IRC5 PS-RS: RobotStudio**
6. IRC5 PG2: Programming basics 2
7. Individual refresher course / advanced course

IRC5 PG2: Programming basics 2

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Operating and learning the editing and testing options on the robot in RobotStudio (online functionality) and with the virtual control
- The application of a programming tool for editing and testing programs on the computer

Contents
- Occupational health and safety
- Using the extended set of commands and optional arguments
- Producing and using your own routines and modules
- Programming your own instructions and functions
- System parameters (use of the system signals, password protection, etc.)
- Troubleshooting and interrupt programming
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Local, global and routine data
- Writing programs on the computer (offline and online)

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,050 EUR / participant

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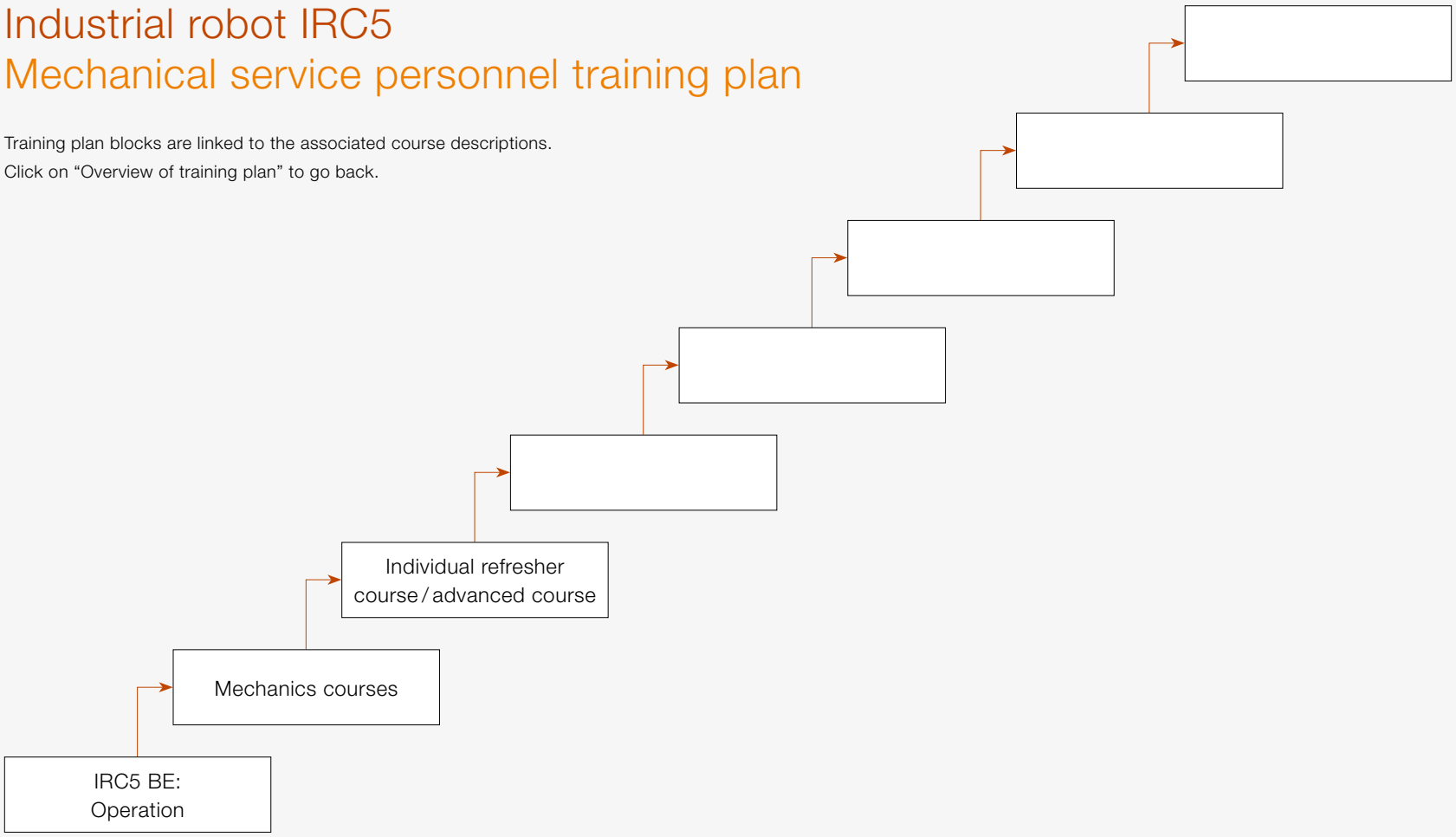
Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 PS-I: Initiation
3. Application engineering courses as required
4. Special programming as required
5. IRC5 PS-RS: RobotStudio
6. **IRC5 PG2: Programming basics 2**
7. Individual refresher course / advanced course

Industrial robot IRC5
Mechanical service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 BE: Operation

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,250 EUR / participant

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Overview of training plan
1. **IRC5 BE: Operation**
2. Mechanics courses
3. Individual refresher course / advanced course

IRC5 ME 120: Mechanics course on robot mechanics IRB 120

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 140: Mechanics course on robot mechanics IRB 140

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 1600/1600ID: Mechanics course on robot mechanics IRB 1600/1600ID

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 2,400 EUR/participant
Note: The mechanics course for IRB 1600ID takes the form of the IRB 2600 mechanics course

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course/advanced course

IRC5 ME 2400: Mechanics course on robot mechanics IRB 2400 / M2004

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 2600 / 2600ID: Mechanics course on robot mechanics IRB 2600 / 2600ID

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 360: Mechanics course on robot mechanics IRB 360

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 4400: Mechanics course on robot mechanics IRB 4400

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 4400 FP: Mechanics course on robot mechanics IRB 4400 FoundryPrime

Target group
Mechanics servicing employee, who maintain Foundry Prime robots

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in FoundryPrime in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Foundry Prime mechanics course module: Explanation of the special features in Foundry Prime version. Specific topics concerning operation and maintenance of Foundry Prime
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

The training course will take place using modified standard robotic mechanisms. Foundry Prime-specific details will be explained using sample parts and/or the documentation

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 4600: Mechanics course on robot mechanics IRB 4600

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 4600 FP: Mechanics course on robot mechanics IRB 4600 FoundryPrime

Target group
Mechanics servicing employee, who maintain Foundry Prime robots

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in FoundryPrime in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Foundry Prime mechanics course module: Explanation of the special features in Foundry Prime version. Specific topics concerning operation and maintenance of Foundry Prime
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

The training course will take place using modified standard robotic mechanisms. Foundry Prime-specific details will be explained using sample parts and/or the documentation

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 6600: Mechanics course on robot mechanics IRB 6600

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 6600 FP / 7600 FP: Mechanics course on robot mechanics IRB 6600 and IRB 7600 FoundryPrime

Target group

Mechanics servicing employee, who maintain Foundry Prime robots

Course goals

- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in FoundryPrime in accordance with regulations

Contents

- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Foundry Prime mechanics course module: Explanation of the special features in Foundry Prime version. Specific topics concerning operation and maintenance of Foundry Prime
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites

- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information

Course duration: 5 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

The training course will take place using modified standard robotic mechanisms of type IRB 660. Foundry Prime-specific details of type IRB 7600 will be explained using sample parts and/or the documentation

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Overview of training plan

1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 6640: Mechanics course on robot mechanics IRB 6640

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME 6640 FP : Mechanics course on robot mechanics IRB 6640 FoundryPrime

Target group
Mechanics servicing employee, who maintain Foundry Prime robots

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in FoundryPrime in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Foundry Prime mechanics course module: Explanation of the special features in Foundry Prime version. Specific topics concerning operation and maintenance of Foundry Prime
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

The training course will take place using modified standard robotic mechanisms. Foundry Prime-specific details will be explained using sample parts and/or the documentation

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Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5 ME FoundryPrime : Mechanics course on FoundryPrime

Target group
Mechanics servicing employee, who maintain Foundry Prime robots

Course goals
- Learn about the special features of the Foundry Prime version
- Master specific requirements for operation

Contents
- Occupational health and safety
- Explanation of the special features in Foundry Prime version
- Specific topics concerning operation and maintenance of Foundry Prime

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 2 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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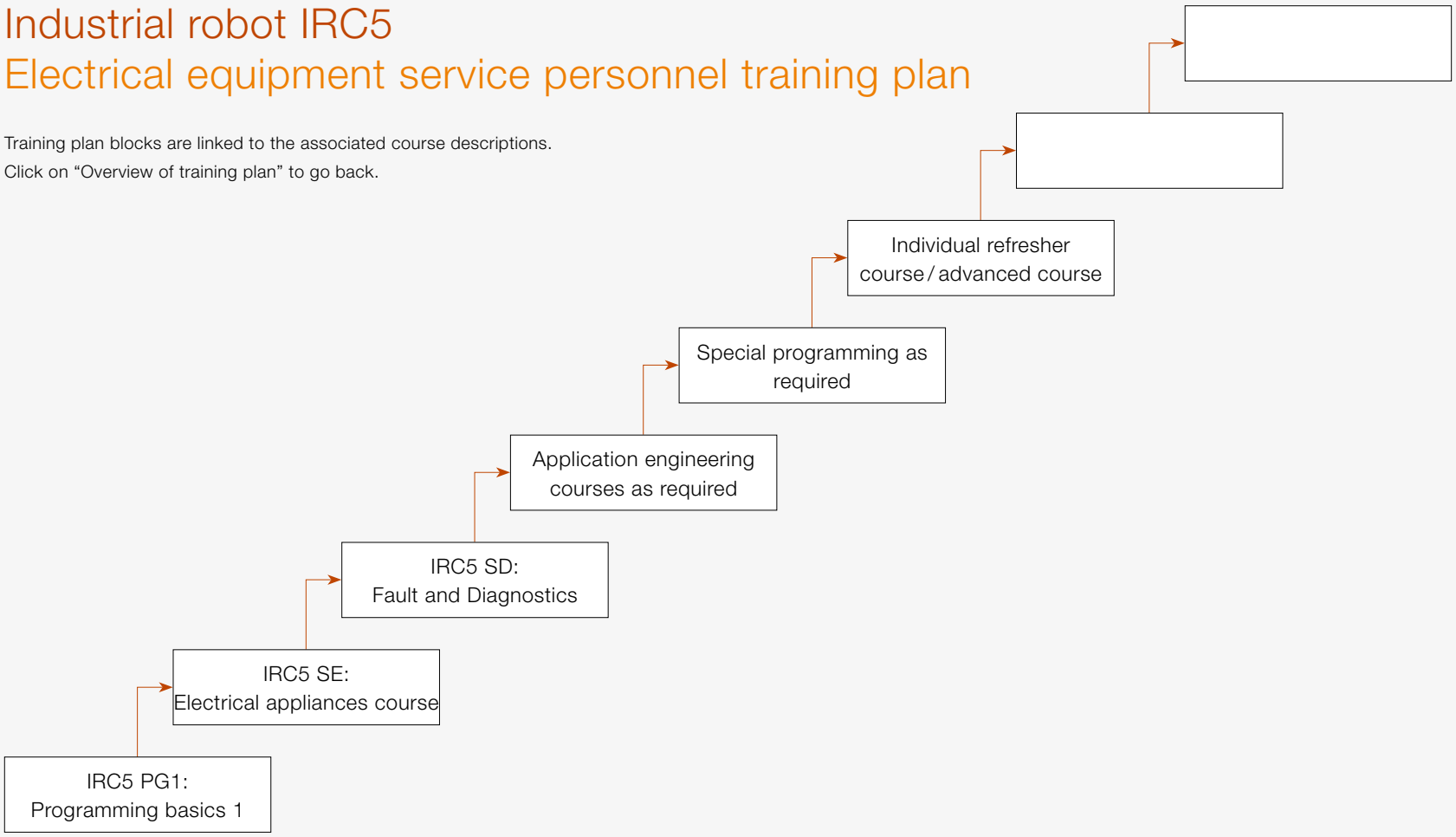
Overview of training plan
1. IRC5 BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

Industrial robot IRC5
Electrical equipment service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **IRC5 PG1: Programming basics 1**
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. Special programming as required
6. Individual refresher course / advanced course

IRC5 SE: Electrical appliances course

Target group
Commissioning employee, electrical appliances servicing employee

Course goals
- System overview
- Locating system faults
- Rapid diagnosis of the cause of the error can minimise downtime

Contents
- Occupational health and safety
- Detailed explanation of the structure and working method of the control of the robot
- Program errors and how to recognise them
- System parameters: Meaning, change, backup
- Checking calibration, updating revolution counter, fine-calibration
- Working with circuit diagrams
- Practical exercises for error recognition, systematic error diagnostics with the help of suitable software (RobotStudio, terminal program)
- Producing a system, installation of the control software
- Loading and executing test programs

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills
- Electrical engineering qualification

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **IRC5 SE: Electrical appliances course**
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. Special programming as required
6. Individual refresher course / advanced course

IRC5 SD: Fault and Diagnostics

Target group
Start-up engineers, electrical appliances servicing employees

Course goals
- Expansion of knowledge about systematic troubleshooting
- Application of the diagnostic facilities of the IRC5 controller
- Ordered methods of combating faults

Contents
- Occupational health and safety
- Refresher, deepening and expanding the basics from the service course (SE)
- Develop a fault and analysis strategy for more efficient troubleshooting based on case studies
- Plan and structure procedures based on the troubleshooting method (MeFes)
- Aftercare and avoidance of future faults
- Use measurement tools to perform diagnostics (e.g. oscilloscopes, bus testers, etc.)
- Using ABB supplied software and recommendations for using external software

Prerequisites
- Participation in a IRC5 SE course
- Electro-technical training
- Sound computer skills

Information
Course duration: 2.5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. **IRC5 SD: Fault and Diagnostics**
4. Application engineering courses as required
5. Special programming as required
6. Individual refresher course / advanced course

IRC5 APT-KS-IPS: Adhesion and sealing – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling application processes; maintaining, configuring and extending the control system
- Independently developing, implementing, testing, optimising and documenting simple application programs
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application “Integrated Dispensing Function Pac”
- Getting to know and applying application related data types, instructions and software commands
- Programming adhesive seams
- Evaluating and optimising seam results
- Architecture of the “IntegratedProzessSystem”
- Explaining and understanding IPS configurations
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Backup and diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. **Application engineering courses as required**
5. Special programming as required
6. Individual refresher course / advanced course

IRC5 PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with material handling synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS card
- Creating the system prerequisites for the operation of EPS
- Configuration of the EPS card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS: Card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches and SafeMove

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS and SafeMove cards
- Creating the system prerequisites for the operation of EPS and SafeMove
- Configuration of the EPS and SafeMove cards

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Mechanical installation and electrical integration of the SafeMove card
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-FCM: Force Control for Machining

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the Force Control for Machining option
- Getting to know the functionality of the force-controlled process regulation on the machined part

Contents
- Occupational health and safety
- Producing a system with the Force Control for Machining option with the help of the Graphical User Interface (GUI)
- Getting to know and using the graphical user interface
- Aligning the machined part with the force-controlled process regulation
- Getting to know and applying application relating instructions and functions
- Programming the application processes – force-controlled process and speed-controlled process
- Assembly basics

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-S: SafeMove

Target group
Planners, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the SafeMove card
- Creating the system prerequisites for the operation of SafeMove
- Configuration of the SafeMove card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the SafeMove card
- Connecting an initiator
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-XP: Programming external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

IRC5 PS-X: Programming and configuring external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Commissioning an external axis
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Functioning of all components and error diagnostics
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Circuit diagrams, connection variants
- Booting for external axes
- Rectifiers, driver stages, motor units for external axes
- Carrying out configurations and system parameters based on defined specifications
- Fine-tuning the server control by recording its regular behaviour
- Special features such as external transmissions, IndependentMove
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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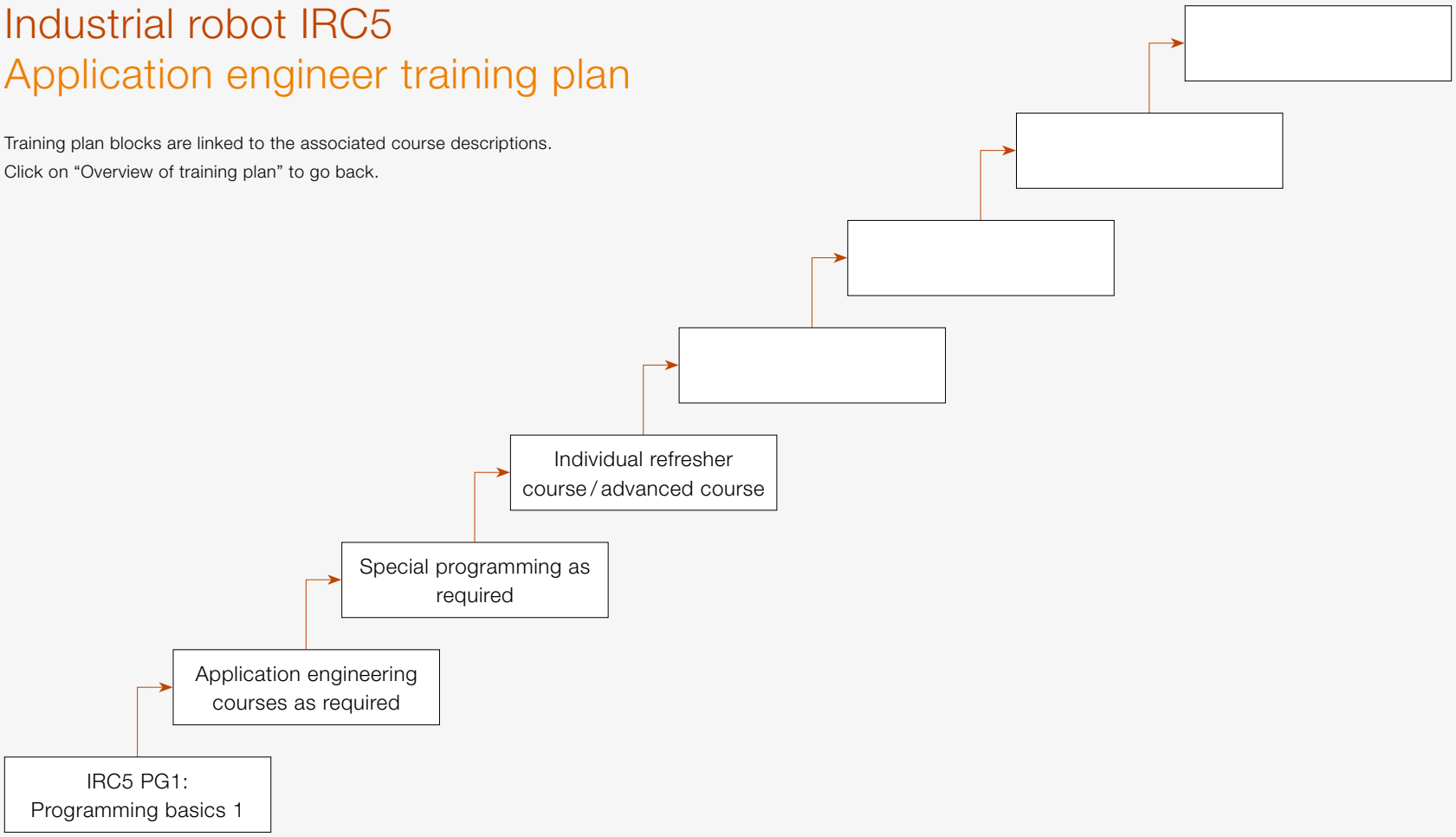
Overview of training plan
1. IRC5 PG1: Programming basics 1
2. IRC5 SE: Electrical appliances course
3. IRC5 SD: Fault and Diagnostics
4. Application engineering courses as required
5. **Special programming as required**
6. Individual refresher course / advanced course

Industrial robot IRC5
Application engineer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5 PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **IRC5 PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-KS: Adhesion Sealing

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Independently developing, implementing, testing, optimising and documenting simple adhesion and seam sealing programs
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software DispenseWare
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Programming adhesive seams
- Evaluating seam results

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-KS-A: Adhesion Sealing – Application

Target group
Mechanical servicing employee, application mechanic

Course goals
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application "Integrated Dispensing Function Pac"
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Carrying out maintenance and repairs on SPA400 / SPA410
- Carrying out maintenance and repairs on the dosing device
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding the relevant maintenance instructions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-KS-IPS: Adhesion and sealing – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling application processes; maintaining, configuring and extending the control system
- Independently developing, implementing, testing, optimising and documenting simple application programs
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functioning of the application “Integrated Dispensing Function Pac”
- Getting to know and applying application related data types, instructions and software commands
- Programming adhesive seams
- Evaluating and optimising seam results
- Architecture of the “IntegratedProzessSystem”
- Explaining and understanding IPS configurations
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Backup and diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-P: Spot welding

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated spot welding tongs
- Setting up spot welding tongs on the IRB
- Teaching basic skills on the structure and process in a spot welding plant
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- Teaching the application software SpotWare
- Connecting the welding controls to the controls of the robot system
- Getting to know and applying application related instructions and software commands
- Getting to know and applying application related data types
- Adjusting application related system parameters
- Tong measurement
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-RB: Roller beading

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- This application gives you the skills you need to safely move the IRB with integrated roller beading tool
- Setting up a roll beading tool on the IRB
- Teaching basic skills on the structure and process in a roll beading application
- Recognising and optimising problematic processes
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Mechanical and electrical structure of the application
- How the system works
- Adjusting application related system parameters
- Getting to know and applying application related instructions and software commands
- Discussing RH system modules
- Performing RH calibration
- Writing and testing application program

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-S1: Shielded arc welding 1

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- Making changes to the application
- Making weld seams

Contents
- Occupational health and safety in dealing with the application
- Teaching the application software ArcWare
- Using the ABB-Production-Manager
- Getting to know and applying application related instructions and software commands
- Programming weld seams with predefined welding data
- Correcting weld seams

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 APT-S2: Shielded arc welding 2

Target group
Programmers, start-up engineers, plant managers, application engineers

Course goals
- The independent programming of a welding plant
- Making changes/optimisations to the application

Contents
- Occupational health and safety in dealing with the application
- Safety with robot welding plants
- Occupational health and safety of inert gas welding
- Adjusting application related system parameters
- Systematic structure of a welding program with observation of the programming guidelines
- Definition of seam, pendulum and welding data
- Programming weld seams
- Programming with external axes
- Troubleshooting the welding program
- Error diagnostics in the welding program
- Automatic TCP measurement and monitoring
- Basics of the different types of arcs
- Welding with different material strengths
- Documenting the welding routines

Prerequisites
- Participation in the application course on Inert gas welding 1
- Arc welding skills
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with material handling synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS card
- Creating the system prerequisites for the operation of EPS
- Configuration of the EPS card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS: Card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-EPS: ElectronicPositionSwitches and SafeMove

Target group
Project managers, programmers, start-up engineers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the EPS and SafeMove cards
- Creating the system prerequisites for the operation of EPS and SafeMove
- Configuration of the EPS and SafeMove cards

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the EPS card
- Connecting an initiator
- Producing a system with the EPS option
- Creating a security user
- Configuration of the EPS application
- Help routines for supporting EPS
- Testing and documentation of the EPS configuration
- Mechanical installation and electrical integration of the SafeMove card
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-HPR: HomePosRunning

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the HomePosRunning option
- Definition and secure storage of the machined parts with the HomePosRunning functionality

Contents
- Occupational health and safety
- Producing a system with the HomePosRunning option
- Functionality and operation of HomePosRunning
- Writing a program whilst taking into account the HomePosRunning functionality
- Getting to know and applying application relating instructions and functions
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-FCM: Force Control for Machining

Target group
Planners, start-up engineers, programmers

Course goals
- Understanding and setting up the Force Control for Machining option
- Getting to know the functionality of the force-controlled process regulation on the machined part

Contents
- Occupational health and safety
- Producing a system with the Force Control for Machining option with the help of the Graphical User Interface (GUI)
- Getting to know and using the graphical user interface
- Aligning the machined part with the force-controlled process regulation
- Getting to know and applying application relating instructions and functions
- Programming the application processes – force-controlled process and speed-controlled process
- Assembly basics

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-S: SafeMove

Target group
Planners, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Mechanical / Electrical integration of the SafeMove card
- Creating the system prerequisites for the operation of SafeMove
- Configuration of the SafeMove card

Contents
- Occupational health and safety
- Mechanical installation and electrical integration of the SafeMove card
- Connecting an initiator
- Producing a system with the SafeMove option
- Creating a security user
- Configuration of the SafeMove application
- Help routines for supporting SafeMove
- Using the TestSignalViewer to integrate external axes
- Testing and documentation of the SafeMove configuration
- Final functional testing

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-MMV-K: MultiMove – Configuration

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Getting to know the functionality of MultiMove
- Commissioning new MultiMove systems
- Measuring the associated coordinate systems

Contents
- Occupational health and safety
- Structure of the hardware
- Producing a system with the MultiMove option
- Functional monitoring of all components
- Calibrating measurement systems
- Testing the functions of “Synchronised and coordinated movements”
- Getting to know measurement methods for tool / plant object and basic coordinates
- Applying measurement routines
- System parameters and backup

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-MMV-P: MultiMove – Programming

Target group
Planners, start-up engineers, programmers, plant managers, project managers

Course goals
- Performing programming tasks on a configured MultiMove application
- Moving and monitoring the coordinate systems
- Writing movement programs (independent, synchronous, coordinated)
- Special MMV declarations
- The significance and application of MMV instructions
- Examples of program structure / controlling for all tasks

Contents
- Occupational health and safety
- Understanding the movement of the IRB in an MMV system
- Tasks- Loading / Editing / Starting up / Saving
- Independent movements
- Synchronised movements
- Synchronised and coordinated movements
- Controlling the movement task by an additional task
- Special features for coordinated movements / error response
- Task distribution options via an administration task
- Backup
- Programming tracks
- Programming new machined parts

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 2.5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,500 EUR / participant
Notes: Exercises on robots are performed on the systems and types of robots that are available at the Training Center for Robots

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-PM: PickMaster 3

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out the electrical and mechanical commissioning of the robot system
- Knowing the basic functions of PickMaster
- Connecting material handling technology to the robot system
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- System structure
- Installation of the PickMaster software
- Structure and wiring of a PickMaster system
- Structure of the robot programs
- Defining lines and projects
- Calibrating the camera
- Calibrating material handling technology
- PLC connection
- Backing up the whole system

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 persons per company
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 9,600 EUR / course with a maximum of 3 persons per company

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-XP: Programming external axes

Target group
Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals
- Getting to know the control functions
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5 PS-X: Programming and configuring external axes

Target group

Planners, project managers, start-up engineers, programmers, electrical appliances servicing employees

Course goals

- Getting to know the control functions
- Commissioning an external axis
- Using external axes in the robot system
- Moving the robot or the plant object using coordinated external axes
- Functioning of all components and error diagnostics
- Individual course goals can be agreed together with the participants

Contents

- Occupational health and safety
- Circuit diagrams, connection variants
- Booting for external axes
- Rectifiers, driver stages, motor units for external axes
- Carrying out configurations and system parameters based on defined specifications
- Fine-tuning the server control by recording its regular behaviour
- Special features such as external transmissions, IndependentMove
- Programming with an axis that rotates a device
- Programming uncoordinated linear and rotating axes
- Programming coordinated linear and rotating axes
- Programming dependent axes
- Programming independent axes
- Programming a robot on a process axis
- Measuring coordinate systems and moved plant objects
- Activating and deactivating external axes

Prerequisites

- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information

Course duration: 5 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,500 EUR / participant

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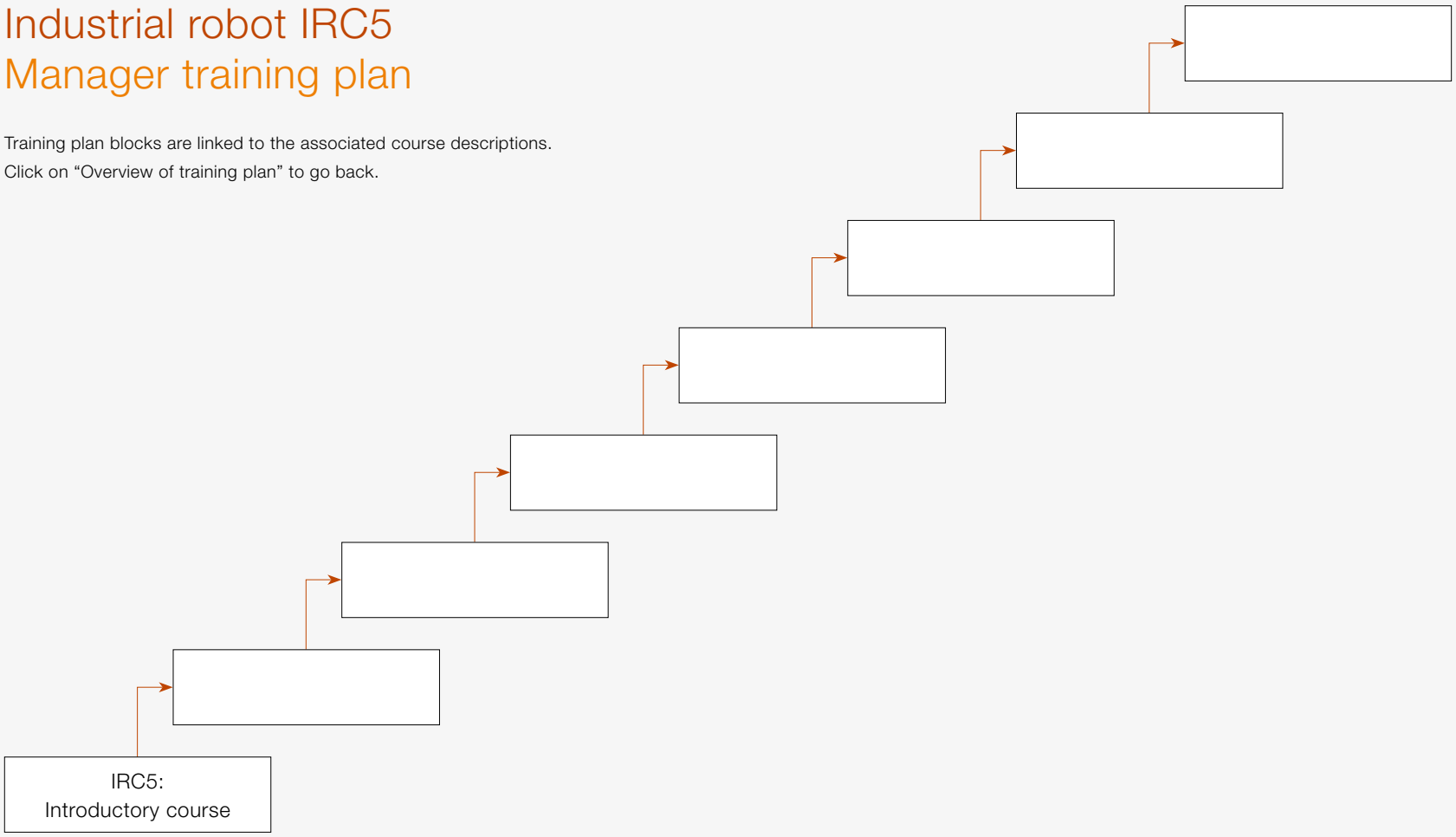
Overview of training plan

1. IRC5 PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

Industrial robot IRC5
Manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5: Introductory course – Industrial robots

Target group
Managers, planners, administrative staff

Course goals
- Getting to know the fields of application for robots
- Perform operating functions independently
- Manual operation
- Loading and testing programs
- Insight into the fields of work of plant operators, programmers and maintenance engineers
- Getting to know the way personnel and procedures cooperate

Contents
- Occupational health and safety
- Robot applications in production practice
- Configuration and function of a robot system
- Types of movement in manual and automatic mode
- Control of inputs and outputs
- Loading and saving modules and programs
- Error messages and situation description
- Documentation and technical support from ABB
- Contact persons and procedures for selected issues

Prerequisites
None

Information
Course duration: 2 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 950 EUR / participant

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Overview of training plan
1. **IRC5: Introductory course – Industrial robots**

IRC5 individual courses

Overview of training plan

Standard courses based on the on-site course programme

Number of days	Price for Monday to Friday	Price for Saturday / Sunday
1	EUR 2,100	EUR 3,150
2	EUR 4,200	EUR 6,300
3	EUR 6,300	
4	EUR 8,400	
5	EUR 10,500	

Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses on site

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

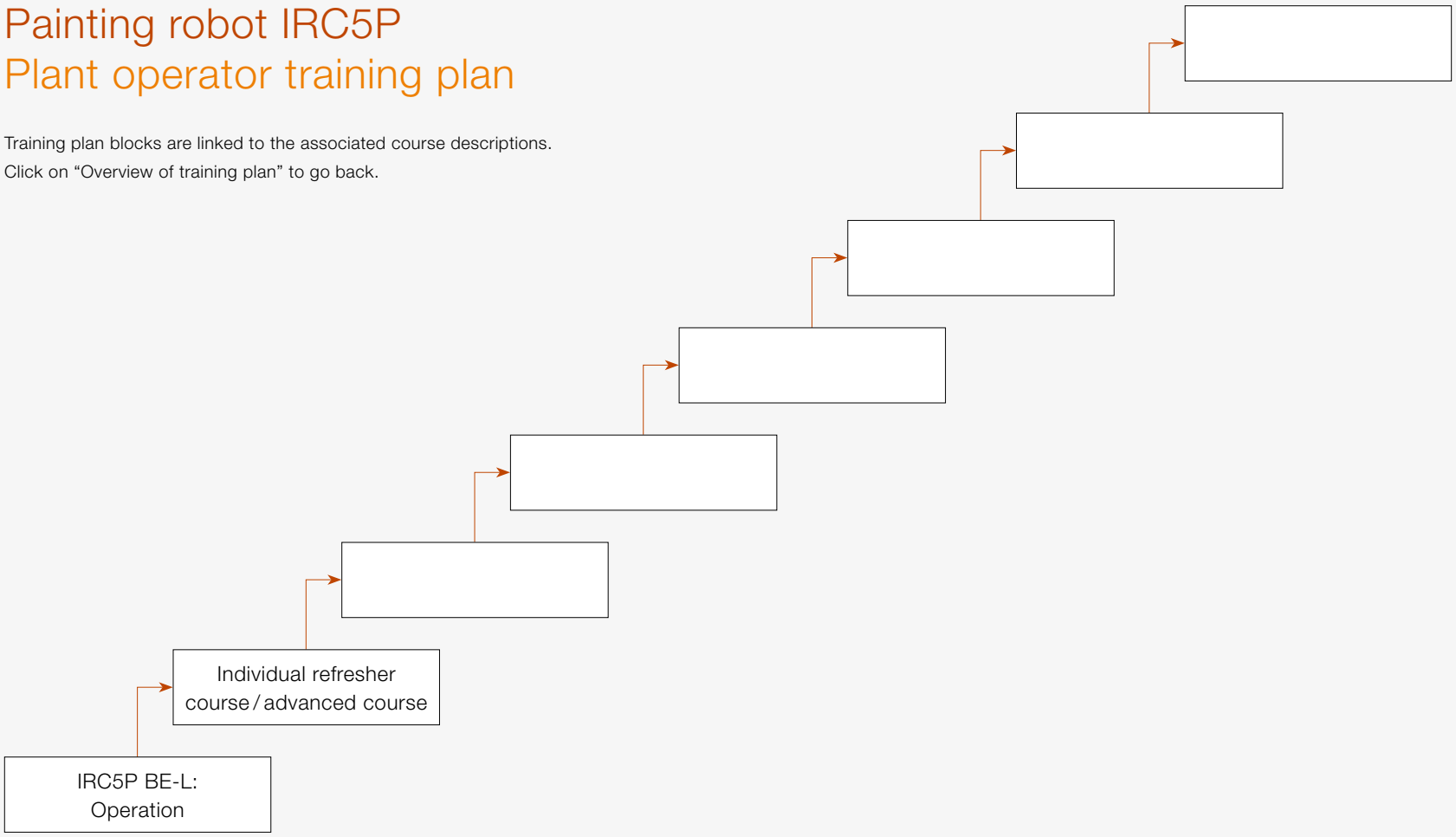
Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours.
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses in the Friedberg Training Center

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

Painting robot IRC5P
Plant operator training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P BE-L: Operation painting

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)
- Making changes to the painting application

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report
- Changing the fan geometry data and shift points

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,450 EUR / participant

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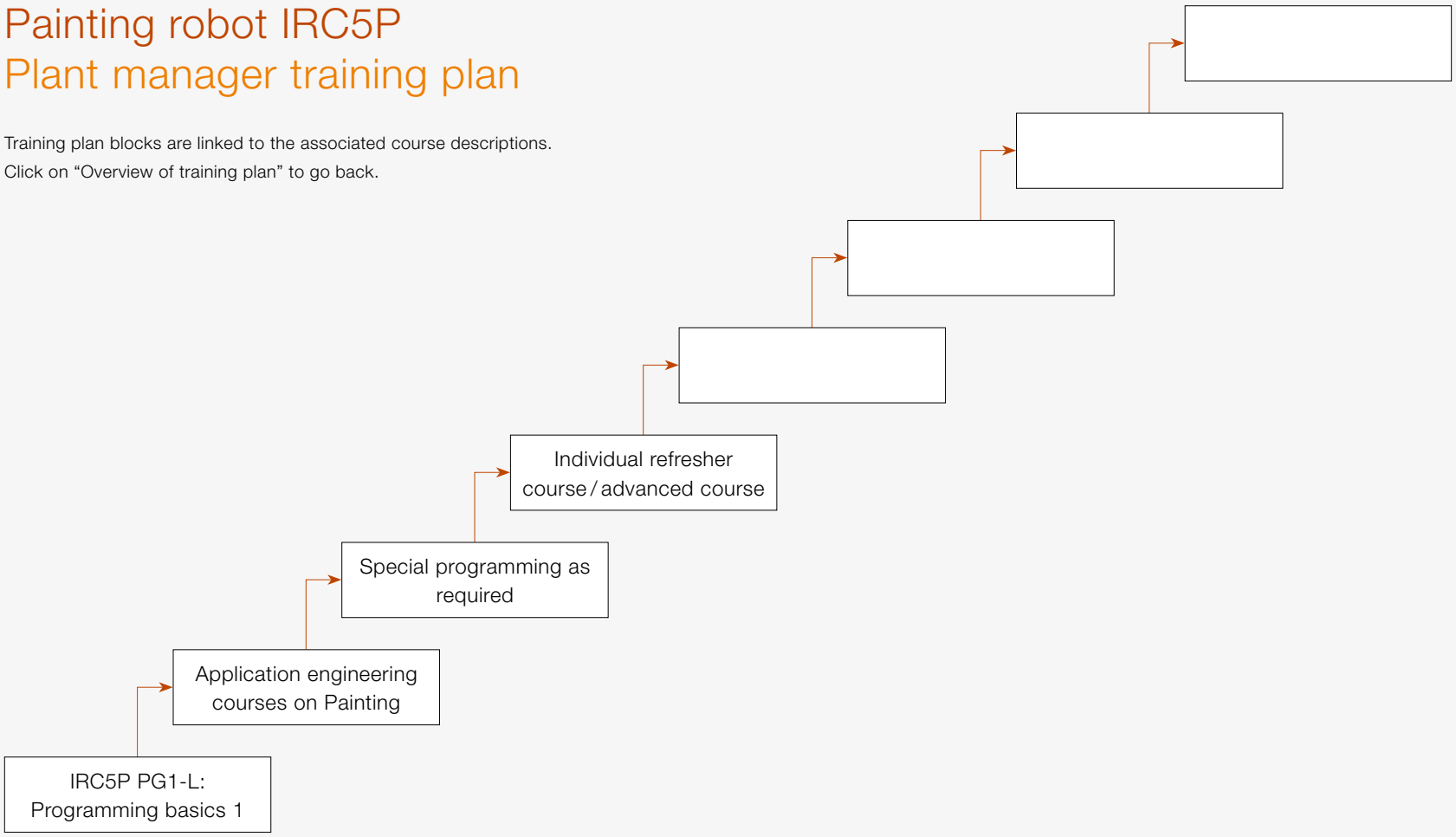
Overview of training plan
1. **IRC5P BE-L: Operation**
2. Individual refresher course / advanced course

Painting robot IRC5P
Plant manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P PG1-L: Programming basics 1 Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”
- Structure and functioning of the processware “RobView”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5P PG1-L: Programming basics 1**
2. Application engineering courses on Painting
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-IPS: Painting – Integrated Process System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application
- Independently developing, implementing, testing, optimising and documenting simple application programs

Contents
- Occupational health and safety in dealing with the application
- Architecture of the IPS system
- Explaining and understanding IPS configurations (open / closed loop)
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Calibration and adjustment of sensors
- Performing an IPS software update
- Diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,350 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-KA: Painting – Conventional application

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions of the conventional painting system
- Recognising and locating faults in the IPS system (RobView)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-CBS: Painting – CartridgeBellSystem

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions and operating method of the CBS system
- Recognising and locating faults in the IPS system (RobView)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels
- Painting PowerPac

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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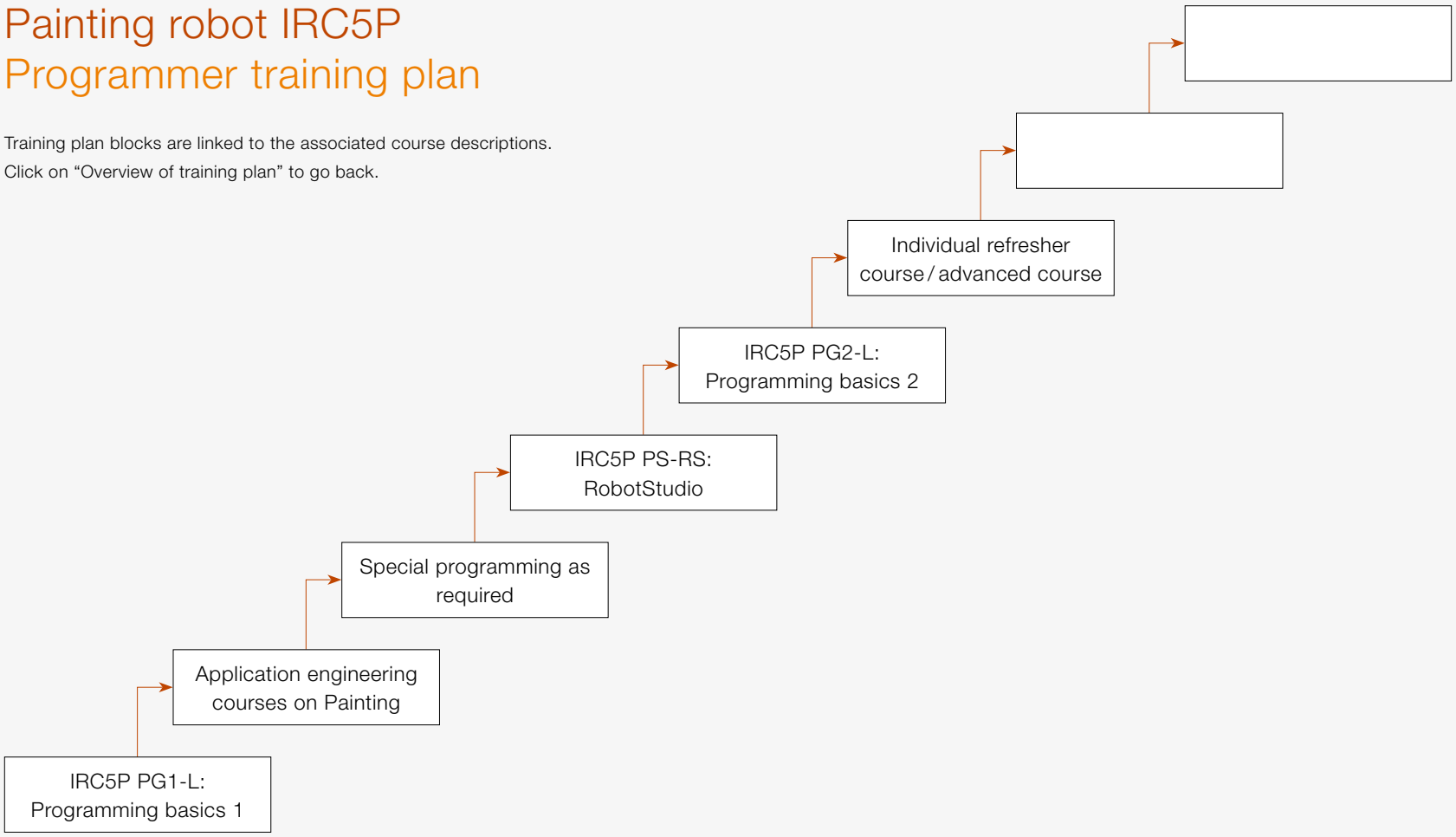
Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

Painting robot IRC5P
Programmer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P PG1-L: Programming basics 1 Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”
- Structure and functioning of the processware “RobView”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5P PG1-L: Programming basics 1**
2. Application engineering courses on Painting
3. Special programming as required
4. IRC5P PS-RS: RobotStudio
5. IRC5P PG2-L: Programming basics 2
6. Individual refresher course / advanced course

IRC5P APT-L-IPS: Painting – Integrated Process System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application
- Independently developing, implementing, testing, optimising and documenting simple application programs

Contents
- Occupational health and safety in dealing with the application
- Architecture of the IPS system
- Explaining and understanding IPS configurations (open / closed loop)
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Calibration and adjustment of sensors
- Performing an IPS software update
- Diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,350 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. IRC5P PS-RS: RobotStudio
5. IRC5P PG2-L: Programming basics 2
6. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. IRC5P PS-RS: RobotStudio
5. IRC5P PG2-L: Programming basics 2
6. Individual refresher course / advanced course

IRC5P PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels
- Painting PowerPac

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. Special programming as required
4. **IRC5P PS-RS: RobotStudio**
5. IRC5P PG2-L: Programming basics 2
6. Individual refresher course / advanced course

IRC5P PG2-L: Programming basics 2 – Painting

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the painting application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Operating and learning the editing and testing options on the robot in RobotStudio (online functionality), RobView and with virtual control
- The application of a programming tool for editing and testing programs on the computer
- Connecting material handling technology to the robot system
- Programming of manufacturing processes with material handling synchronisation

Contents
- Occupational health and safety
- Conveyor tracking: Connecting the additional hardware components such as encoder module, encoder hardware and start signal system, determining the associated parameters and subsequent functional testing
- Programming with material handling synchronisation, reflecting individual positions and whole routines
- Programming world zones for surveying the working area and defining home zones
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Interrupt and multitasking
- Further programming

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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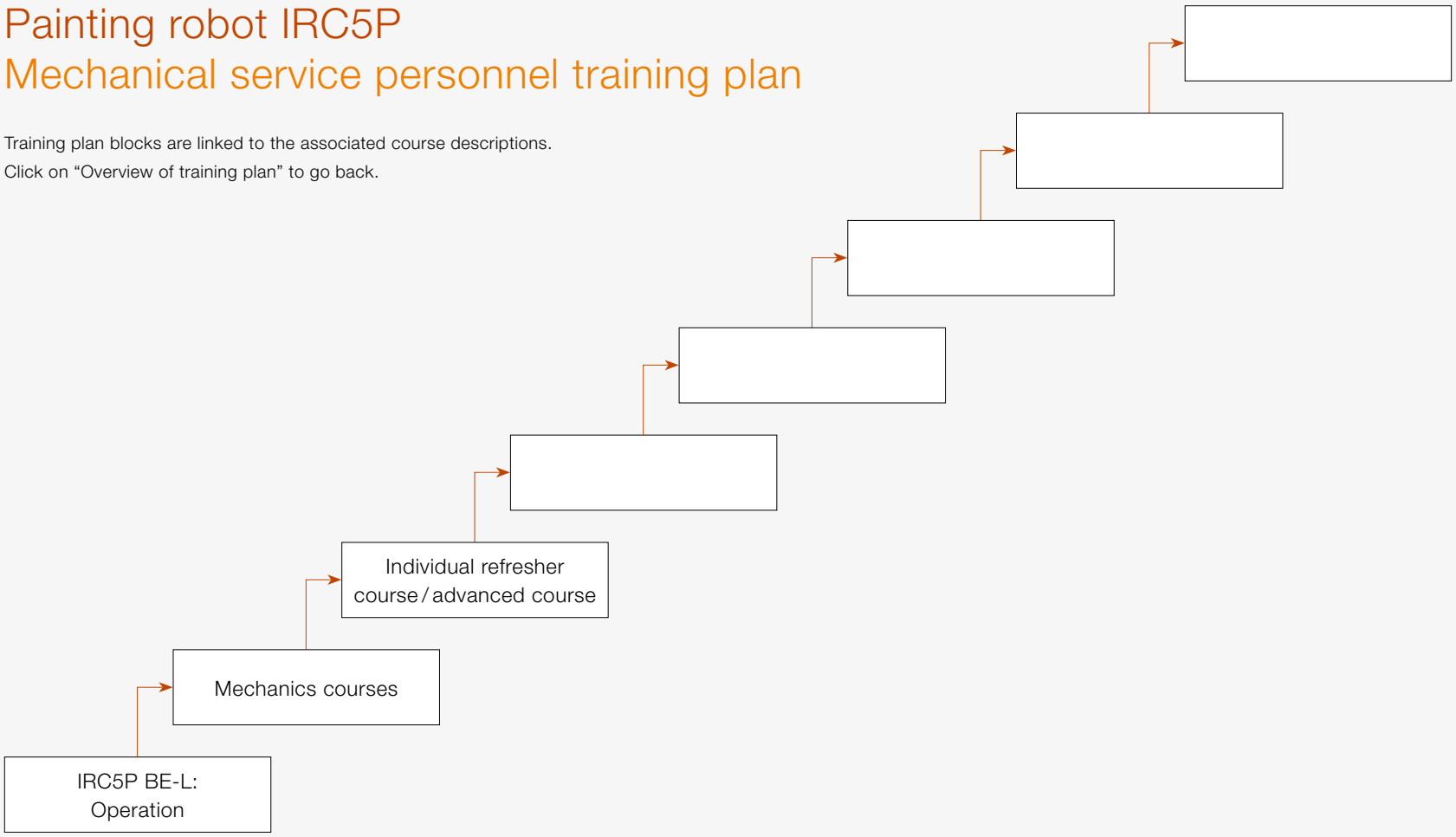
Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. Special programming as required
4. IRC5 PS-RS: RobotStudio
5. **IRC5P PG2-L: Programming basics 2**
6. Individual refresher course / advanced course

Painting robot IRC5P
Mechanical service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P BE-L: Operation painting

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)
- Making changes to the painting application

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report
- Changing the fan geometry data and shift points

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,450 EUR / participant

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Overview of training plan
1. **IRC5P BE-L: Operation**
2. Mechanics courses
3. Individual refresher course / advanced course

IRC5P ME: Mechanics course on robot mechanics IRB 52

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. IRC5P BE-L: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5P ME: Mechanics course on robot mechanics IRB 5400-12

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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Overview of training plan
1. IRC5P BE-L: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

IRC5P ME: Mechanics course on robot mechanics IRB 5500

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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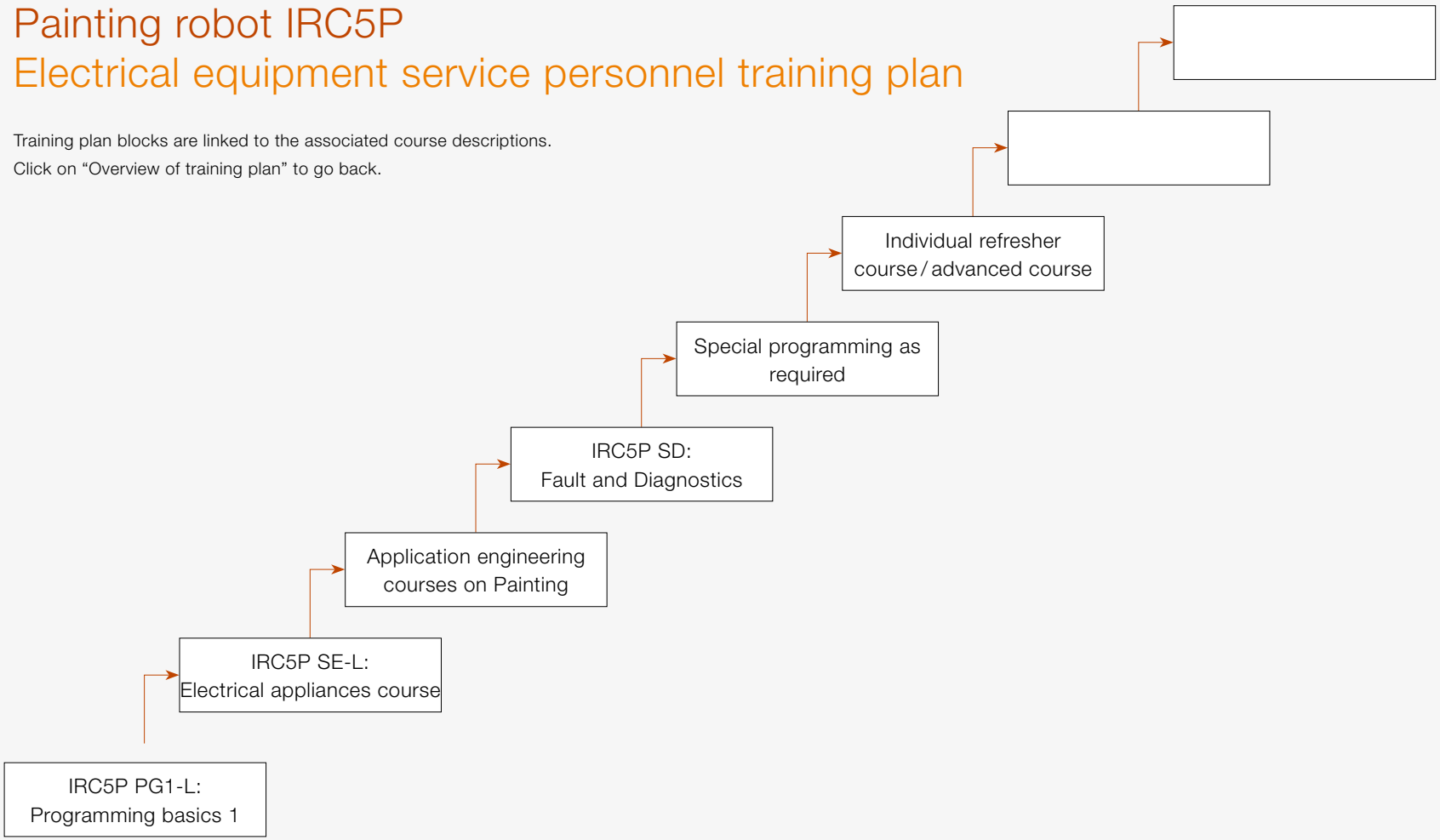
Overview of training plan
1. IRC5P BE-L: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

Painting robot IRC5P
Electrical equipment service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P PG1-L: Programming basics 1 Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”
- Structure and functioning of the processware “RobView”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5P PG1-L: Programming basics 1**
2. IRC5P SE-L: Electrical appliances course
3. Application engineering courses on Painting
4. IRC5P SD: Fault and Diagnostics
5. Special programming as required
6. Individual refresher course / advanced course

IRC5P SE-L: Electrical appliances course

Target group
Commissioning employee, electrical appliances servicing employee

Course goals
- System overview
- Locating system faults
- Rapid diagnosis of the cause of the error can minimise downtime

Contents
- Occupational health and safety
- Detailed explanation of structure and working method of the control of the robot, particularly the ex protection
- Program errors and how to recognise them
- System parameters: Meaning, change, backup
- Checking calibration, updating revolution counter, fine-calibration
- Working with circuit diagrams
- Practical exercises for error recognition, systematic error diagnostics with the help of suitable software (RobView, RobotStudio, terminal program)
- Producing a system, installation of the control software
- Loading and executing test programs

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills
- Electrical engineering qualification

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,550 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **IRC5P SE-L: Electrical appliances course**
3. Application engineering courses on Painting
4. IRC5P SD: Fault and Diagnostics
5. Special programming as required
6. Individual refresher course / advanced course

IRC5P APT-L-IPS: Painting – Integrated Process System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application
- Independently developing, implementing, testing, optimising and documenting simple application programs

Contents
- Occupational health and safety in dealing with the application
- Architecture of the IPS system
- Explaining and understanding IPS configurations (open / closed loop)
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Calibration and adjustment of sensors
- Performing an IPS software update
- Diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,350 EUR / participant

Contact
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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. IRC5P SE-L: Electrical appliances course
3. **Application engineering courses on Painting**
4. IRC5P SD: Fault and Diagnostics
5. Special programming as required
6. Individual refresher course / advanced course

IRC5P SD: Fault and Diagnostics

Target group
Start-up engineers, electrical appliances servicing employees

Course goals
- Expansion of knowledge about systematic troubleshooting
- Application of the diagnostic facilities of the IRC5 controller
- Ordered methods of combating faults

Contents
- Occupational health and safety
- Refresher, deepening and expanding the basics from the service course (SE)
- and the IPS course (APT-L-IPS)
- Develop a fault and analysis strategy for more efficient troubleshooting based on case studies
- Plan and structure procedures based on the troubleshooting method (MeFes)
- Aftercare and avoidance of future faults
- Use measurement tools to perform diagnostics (e.g. oscilloscopes, bus testers, etc.)
- Using ABB supplied software and recommendations for using external software

Prerequisites
- Participation in a IRC5 SE course and the IPS course (APT-L-IPS)
- Electro-technical training
- Sound computer skills

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. IRC5P SE-L: Electrical appliances course
3. Application engineering courses on Painting
4. **IRC5P SD: Fault and Diagnostics**
5. Special programming as required
6. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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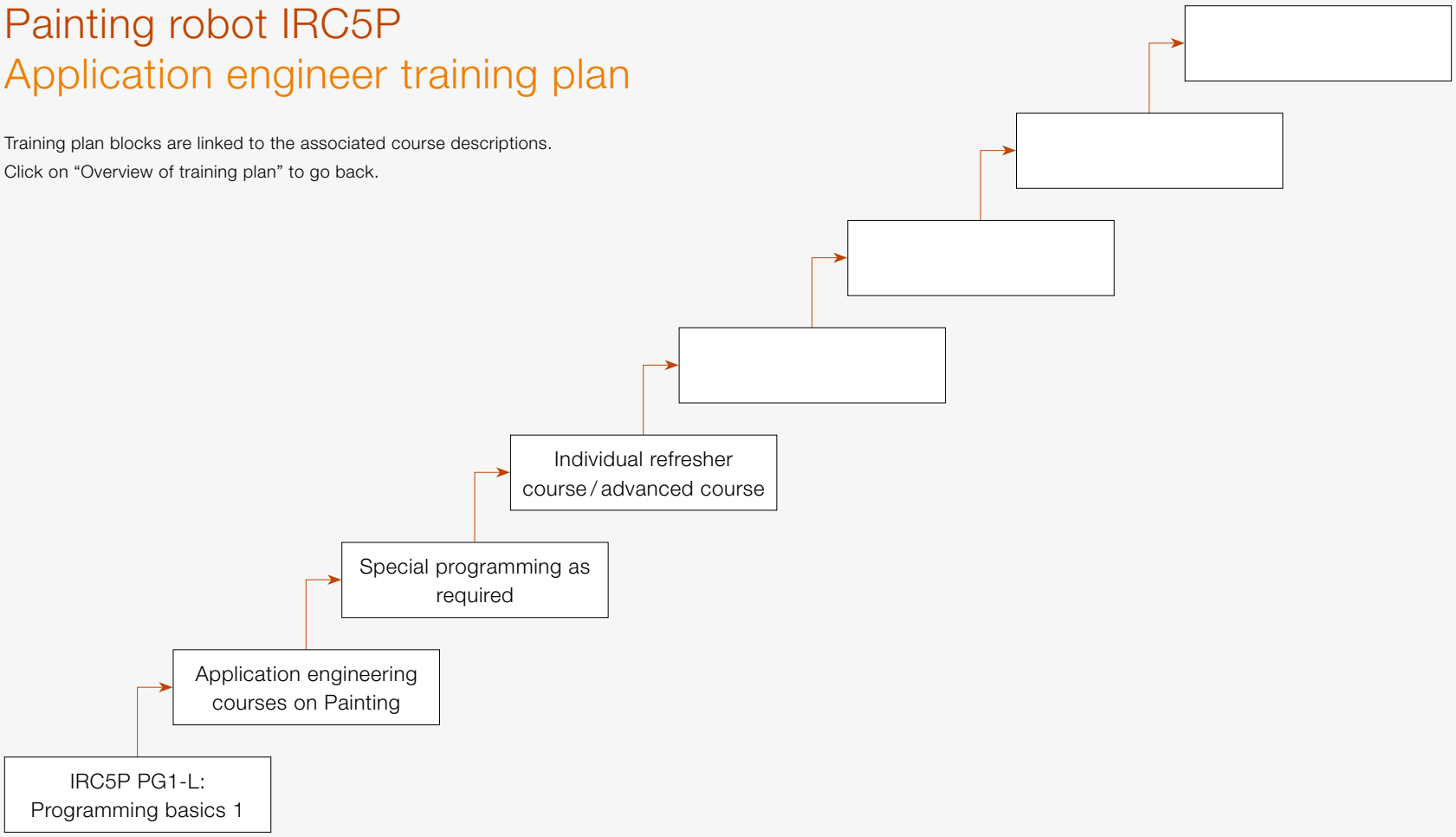
Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. IRC5P SE-L: Electrical appliances course
3. Application engineering courses on Painting
4. IRC5P SD: Fault and Diagnostics
5. **Special programming as required**
6. Individual refresher course / advanced course

Painting robot IRC5P
Application engineer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P PG1-L: Programming basics 1 Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”
- Structure and functioning of the processware “RobView”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **IRC5P PG1-L: Programming basics 1**
2. Application engineering courses on Painting
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-IPS: Painting – Integrated Process System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application
- Independently developing, implementing, testing, optimising and documenting simple application programs

Contents
- Occupational health and safety in dealing with the application
- Architecture of the IPS system
- Explaining and understanding IPS configurations (open / closed loop)
- Extending and optimising the existing IPS configuration
- Getting to know and using software programs that support the application (RobView, terminal program, FTP programs)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Calibration and adjustment of sensors
- Performing an IPS software update
- Diagnosis
- Restoring defective systems
- Performing an IPS software update

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,350 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-KA: Painting – Conventional application

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions of the conventional painting system
- Recognising and locating faults in the IPS system (RobView)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5P APT-L-CBS: Painting – CartridgeBellSystem

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions and operating method of the CBS system
- Recognising and locating faults in the IPS system (RobView)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

IRC5 PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
– Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
– Occupational health and safety
– Functioning of the controls in Multitasking
– Storage structure and structure of system parameters
– Programming and integrating background tasks
– Synchronisation of a foreground and background task
– Using joint data elements
– Using interrupt programming
– Sequence chains and dispatcher programming
– Creating a background task with different priorities
– Proposed solutions

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

IRC5P PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels
- Painting PowerPac

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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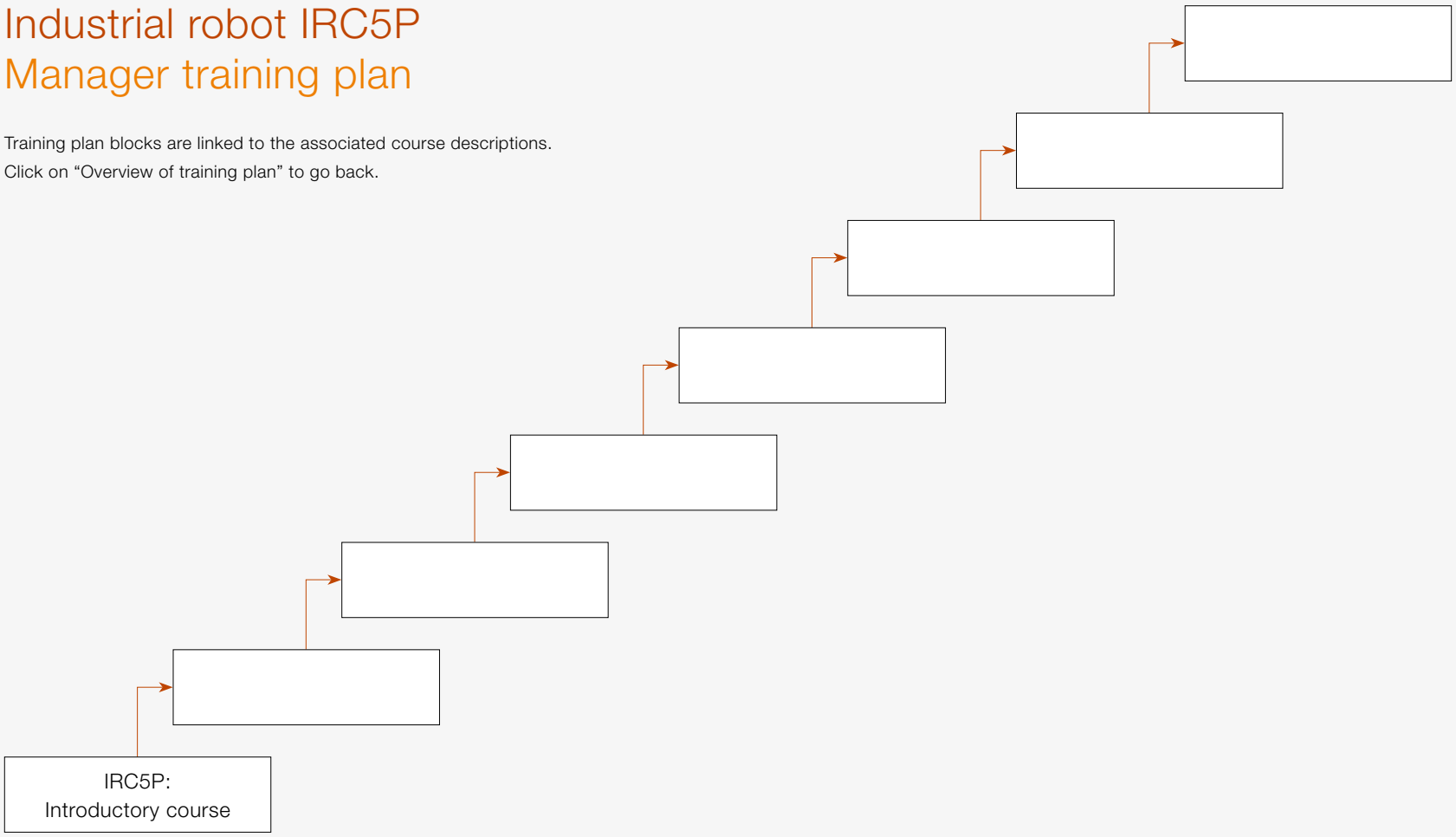
Overview of training plan
1. IRC5P PG1-L: Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

Industrial robot IRC5P
Manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



IRC5P: Introductory course – Paint robots

Target group
Managers, planners, administrative staff

Course goals
- Getting to know the fields of application for robots
- Perform operating functions independently
- Manual operation
- Loading and testing programs
- Insight into the fields of work of plant operators, programmers and maintenance engineers
- Getting to know the way personnel and procedures cooperate

Contents
- Occupational health and safety
- Robot applications in production practice
- Configuration and function of a robot system
- Types of movement in manual and automatic mode
- Control of inputs and outputs
- Loading and saving modules and programs
- Error messages and situation description
- Documentation and technical support from ABB
- Contact persons and procedures for selected issues

Prerequisites
None

Information
Course duration: 2 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 950 EUR / participant

Kontakt
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Overview of training plan
1. **IRC5P: Introductory course**

IRC5P individual courses

Overview of training plan

Standard courses based on the on-site course programme

Number of days	Price for Monday to Friday	Price for Saturday / Sunday
1	EUR 2,100	EUR 3,150
2	EUR 4,200	EUR 6,300
3	EUR 6,300	
4	EUR 8,400	
5	EUR 10,500	

Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses on site

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

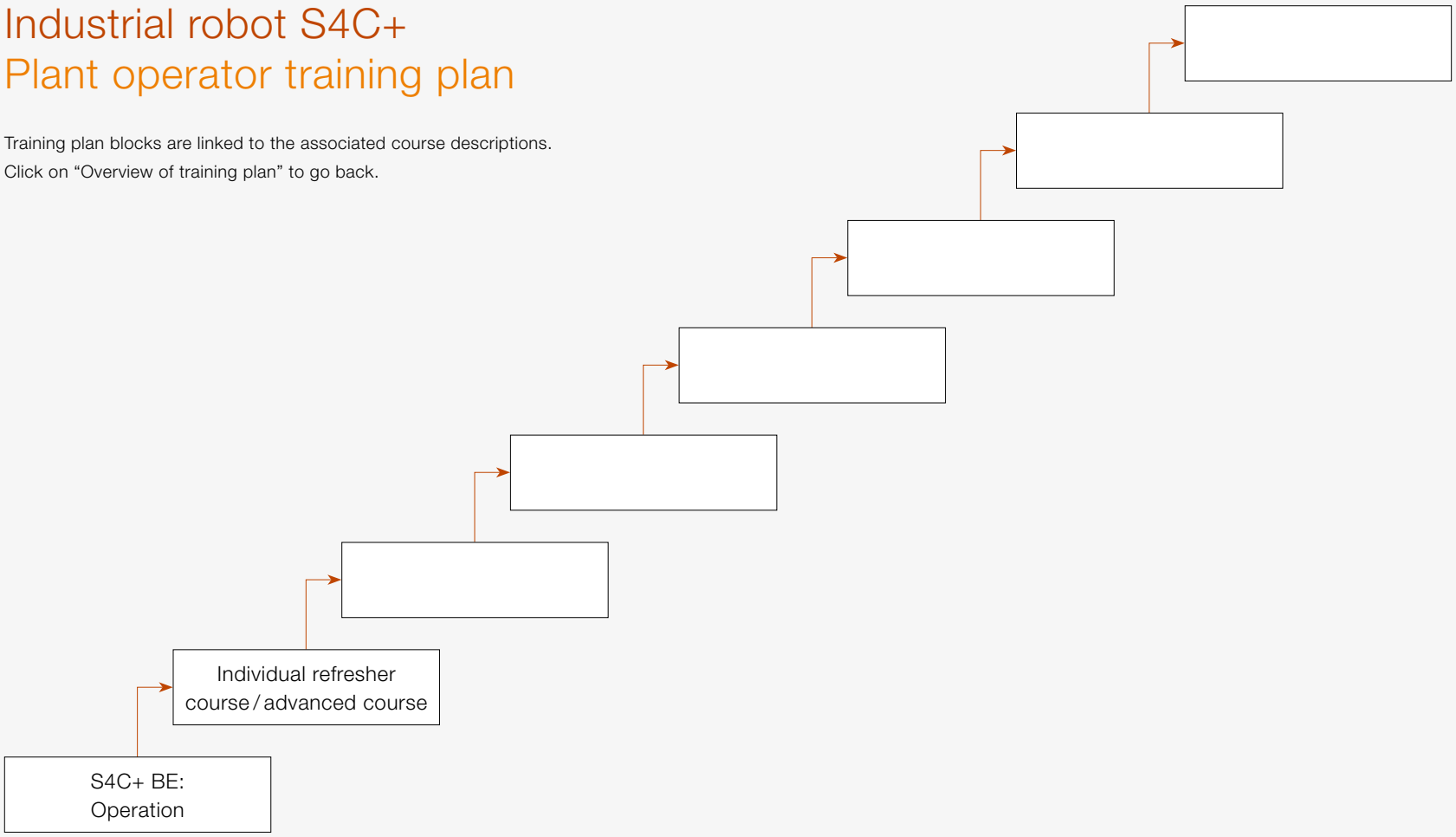
Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours.
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses in the Friedberg Training Center

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

Industrial robot S4C+
Plant operator training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ BE: Operation

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,250 EUR / participant

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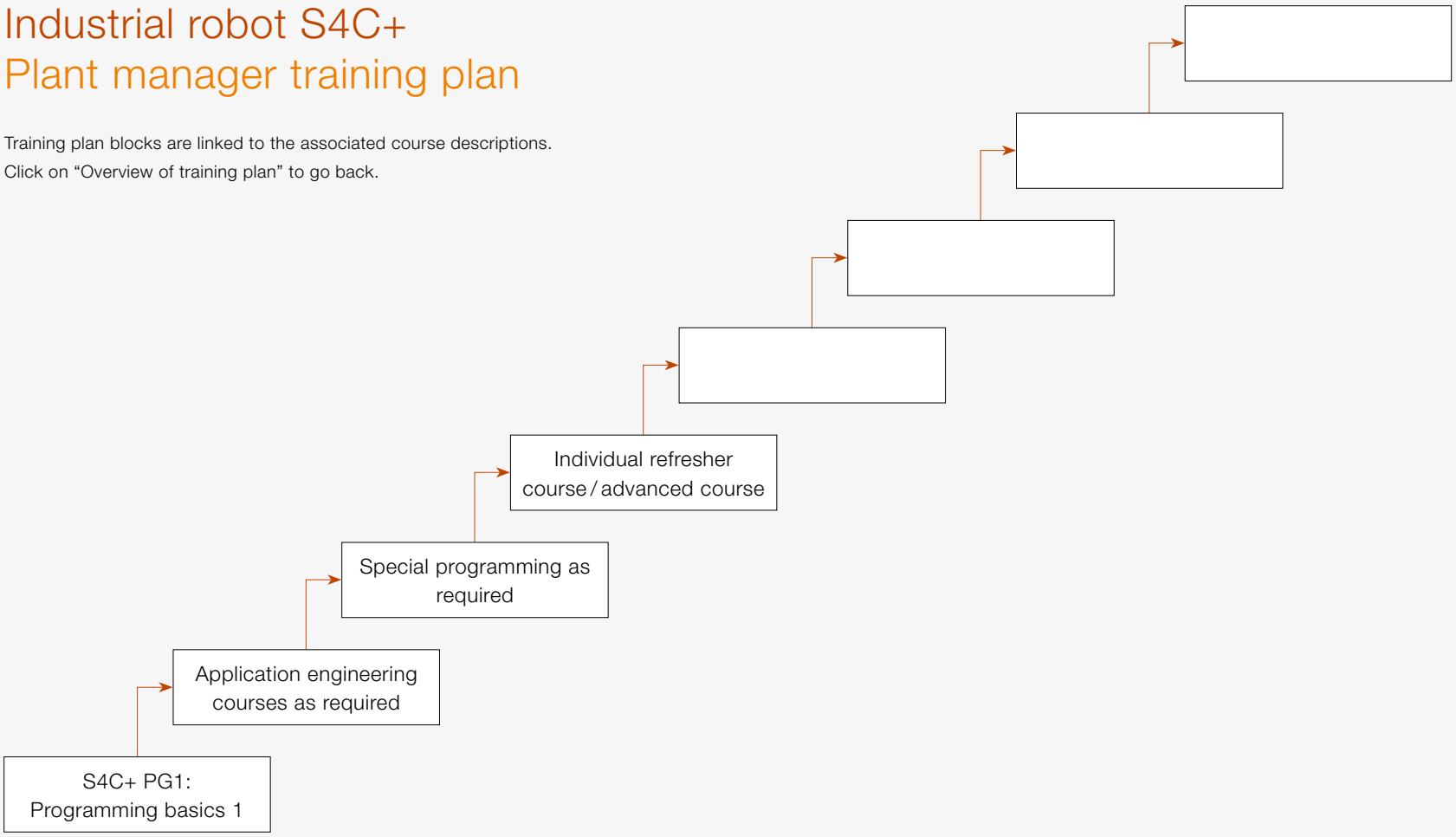
Overview of training plan
1. **S4C+ BE: Operation**
2. Individual refresher course / advanced course

Industrial robot S4C+
Plant manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **S4C+ PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with conveyor belt synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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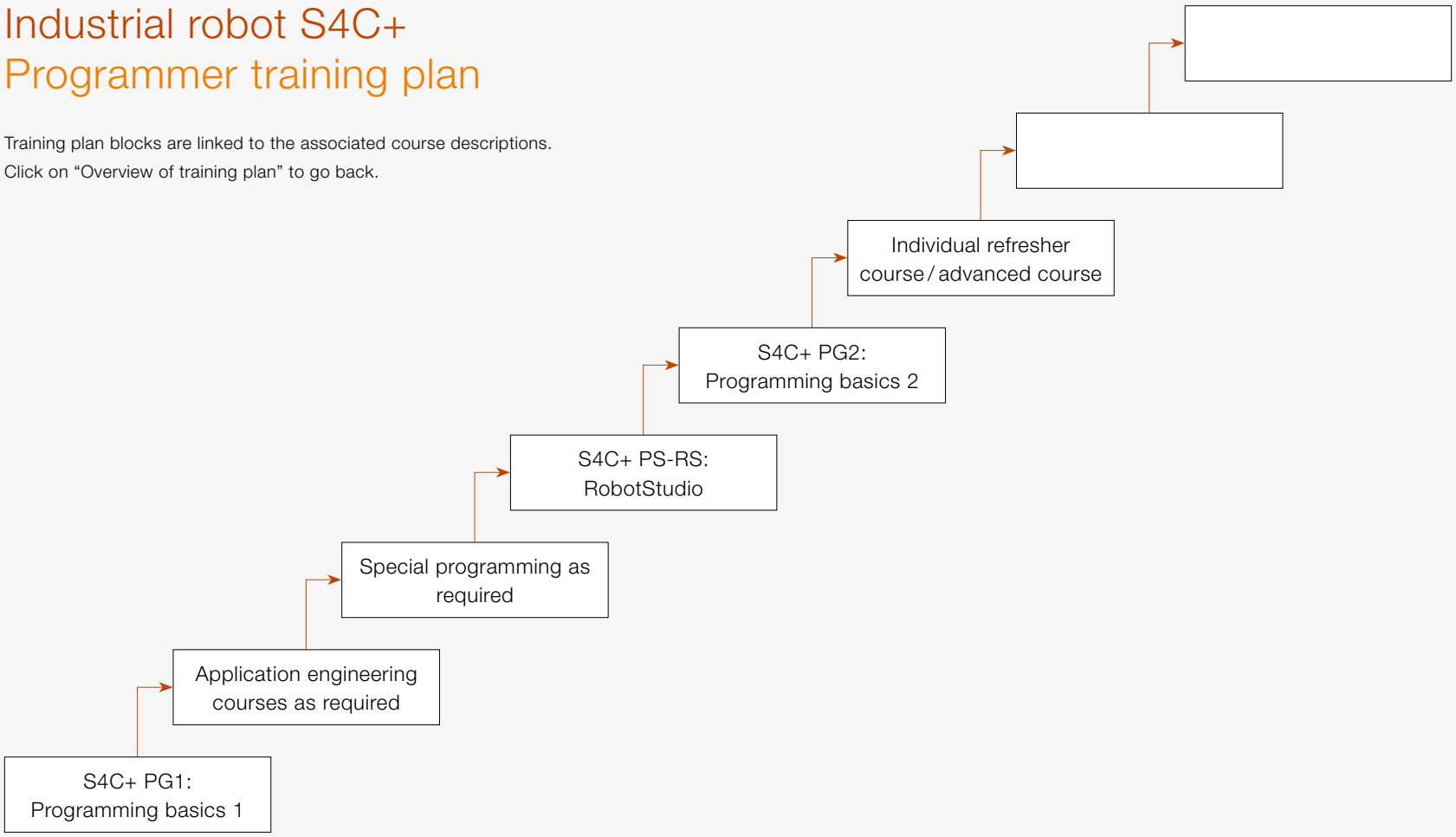
Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

Industrial robot S4C+
Programmer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **S4C+ PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with conveyor belt synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. Special programming as required
4. **S4C+ PS-RS: RobotStudio**
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PG2: Programming basics 2

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Learning and operating the editing and testing options of robots and the learning program QuickTeach
- The application of a programming tool for editing and testing programs on the computer

Contents
- Occupational health and safety
- Using the extended set of commands and optional arguments
- Producing and using your own routines and modules
- Programming your own instructions and functions
- System parameters (use of the system signals, password protection, etc.)
- Troubleshooting and interrupt programming
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Local, global and routine data
- Writing programs on the computer (offline and online)

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,050 EUR / participant

Contact
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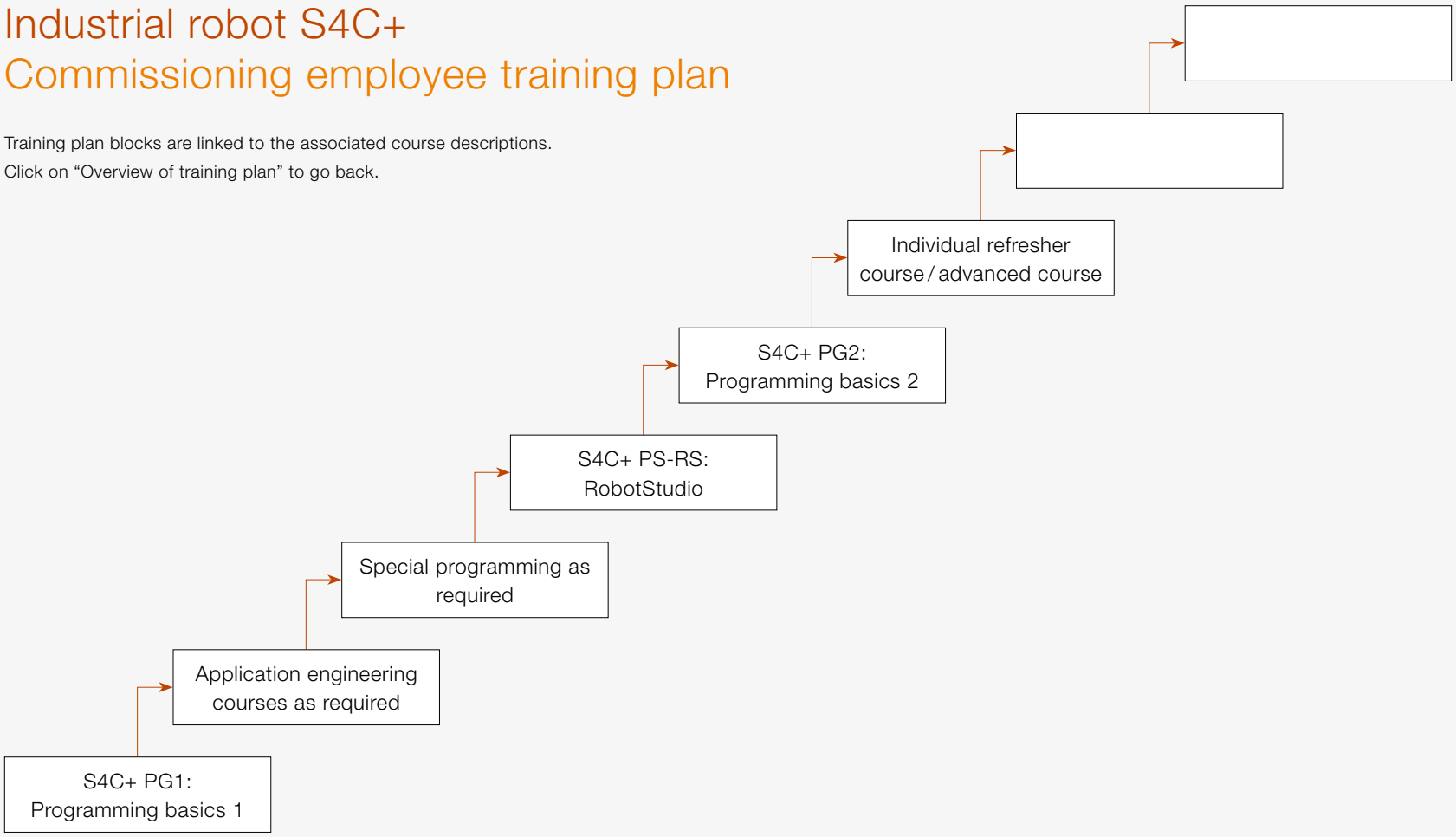
Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. **S4C+ PG2: Programming basics 2**
6. Individual refresher course / advanced course

Industrial robot S4C+
Commissioning employee training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

Contact
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Overview of training plan
1. **S4C+ PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with conveyor belt synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. S4C+ PS-RS: RobotStudio
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. Special programming as required
4. **S4C+ PS-RS: RobotStudio**
5. S4C+ PG2: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PG2: Programming basics 2

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Learning and operating the editing and testing options of robots and the learning program QuickTeach
- The application of a programming tool for editing and testing programs on the computer

Contents
- Occupational health and safety
- Using the extended set of commands and optional arguments
- Producing and using your own routines and modules
- Programming your own instructions and functions
- System parameters (use of the system signals, password protection, etc.)
- Troubleshooting and interrupt programming
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Local, global and routine data
- Writing programs on the computer (offline and online)

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,050 EUR / participant

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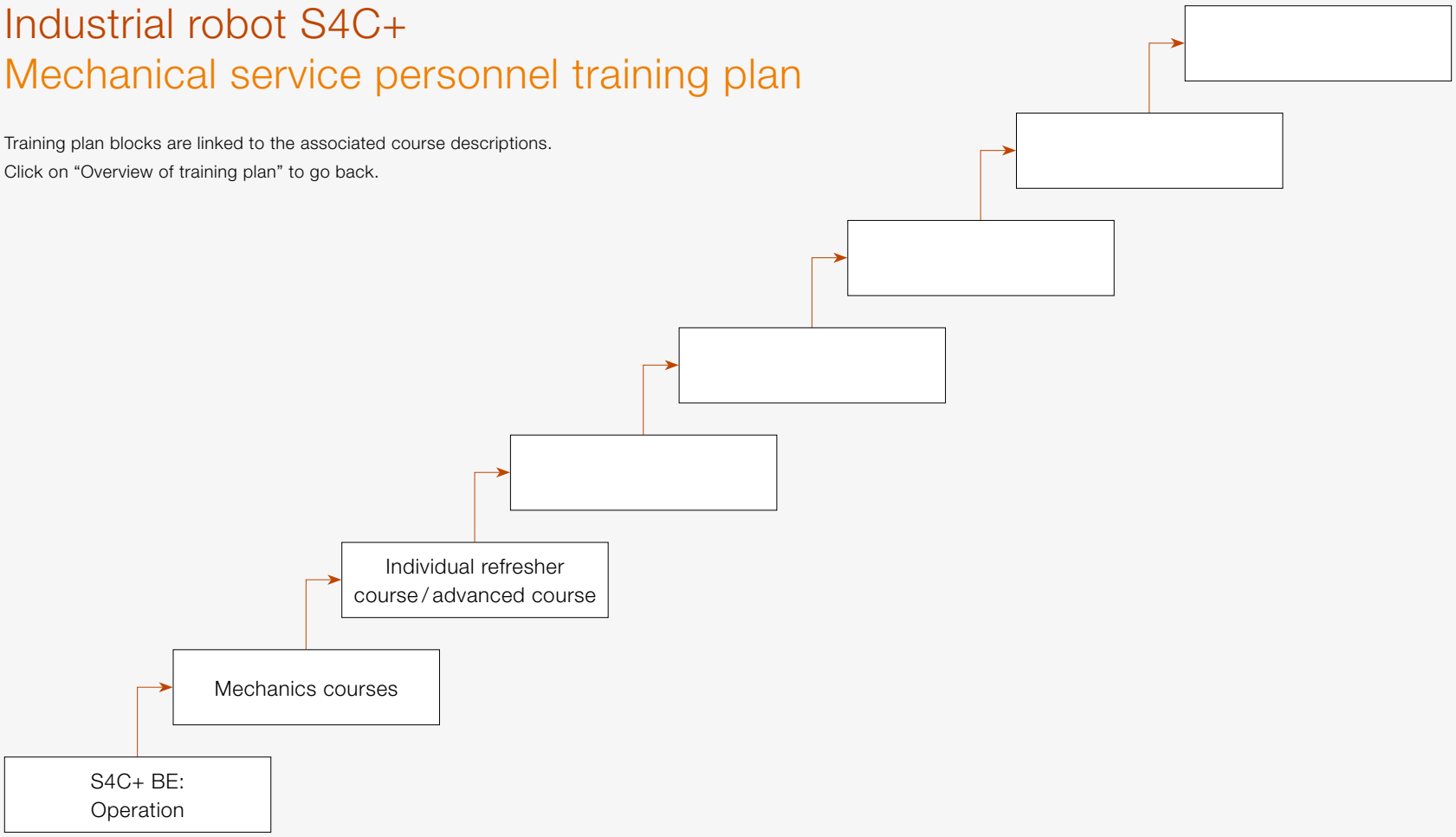
Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. **S4C+ PG2: Programming basics 2**
6. Individual refresher course / advanced course

Industrial robot S4C+
Mechanical service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ BE: Operation

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency stop)

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report

Prerequisites
None

Information
Course duration: 3 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,250 EUR / participant

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Overview of training plan
1. **S4C+ BE: Operation**
2. Mechanics courses
3. Individual refresher course / advanced course

S4C+ ME 140: Mechanics course on robot mechanics IRB 140

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. S4C+ BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

S4C+ ME 2400: Mechanics course on robot mechanics IRB 2400 / M2004

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Note:
There are two versions of Type IRB 2400. You can find the exact name of your appliance on the robot's type plate. The stated course will be performed on the mechanics of the M2004

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. S4C+ BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

S4C+ ME 4400: Mechanics course on robot mechanics IRB 4400

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 3 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,900 EUR / participant

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Overview of training plan
1. S4C+ BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

S4C+ ME 6600: Mechanics course on robot mechanics IRB 6600

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 5 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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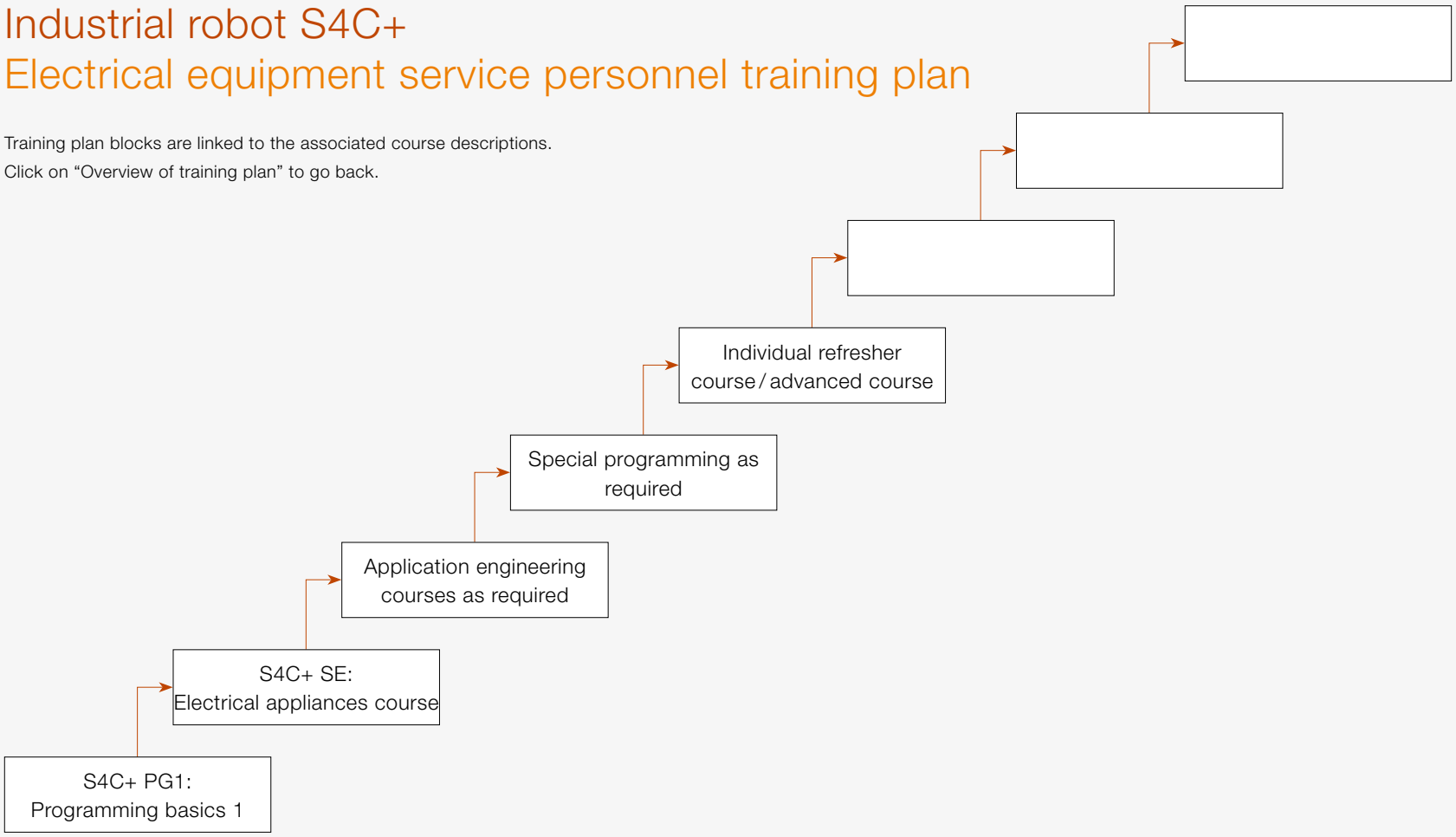
Overview of training plan
1. S4C+ BE: Operation
2. **Mechanics courses**
3. Individual refresher course / advanced course

Industrial robot S4C+
Electrical equipment service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. **S4C+ PG1: Programming basics 1**
2. S4C+ SE: Electrical appliances course
3. Application engineering courses as required
4. Special programming as required
5. Individual refresher course / advanced course

S4C+ SE: Electrical course

Target group
Commissioning employee, electrical appliances servicing employee

Course goals
- System overview
- Locating system faults
- Rapid diagnosis of the cause of the error can minimise downtime

Contents
- Occupational health and safety
- Detailed explanation of the structure and working method of the control of the robot
- Program errors and how to recognise them
- System parameters: Meaning, change, backup
- Checking calibration, updating revolution counter, fine-calibration
- Working with circuit diagrams
- Practical exercises for error recognition, systematic error diagnostics
- Producing a system, installation of the control software
- Loading and executing test programs

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills
- Electrical engineering qualification

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. **S4C+ SE: Electrical appliances course**
3. Application engineering courses as required
4. Special programming as required
5. Individual refresher course / advanced course

S4C+ APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. S4C+ SE: Electrical appliances course
3. **Application engineering courses as required**
4. Special programming as required
5. Individual refresher course / advanced course

S4C+ PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with conveyor belt synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. S4C+ SE: Electrical appliances course
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. S4C+ SE: Electrical appliances course
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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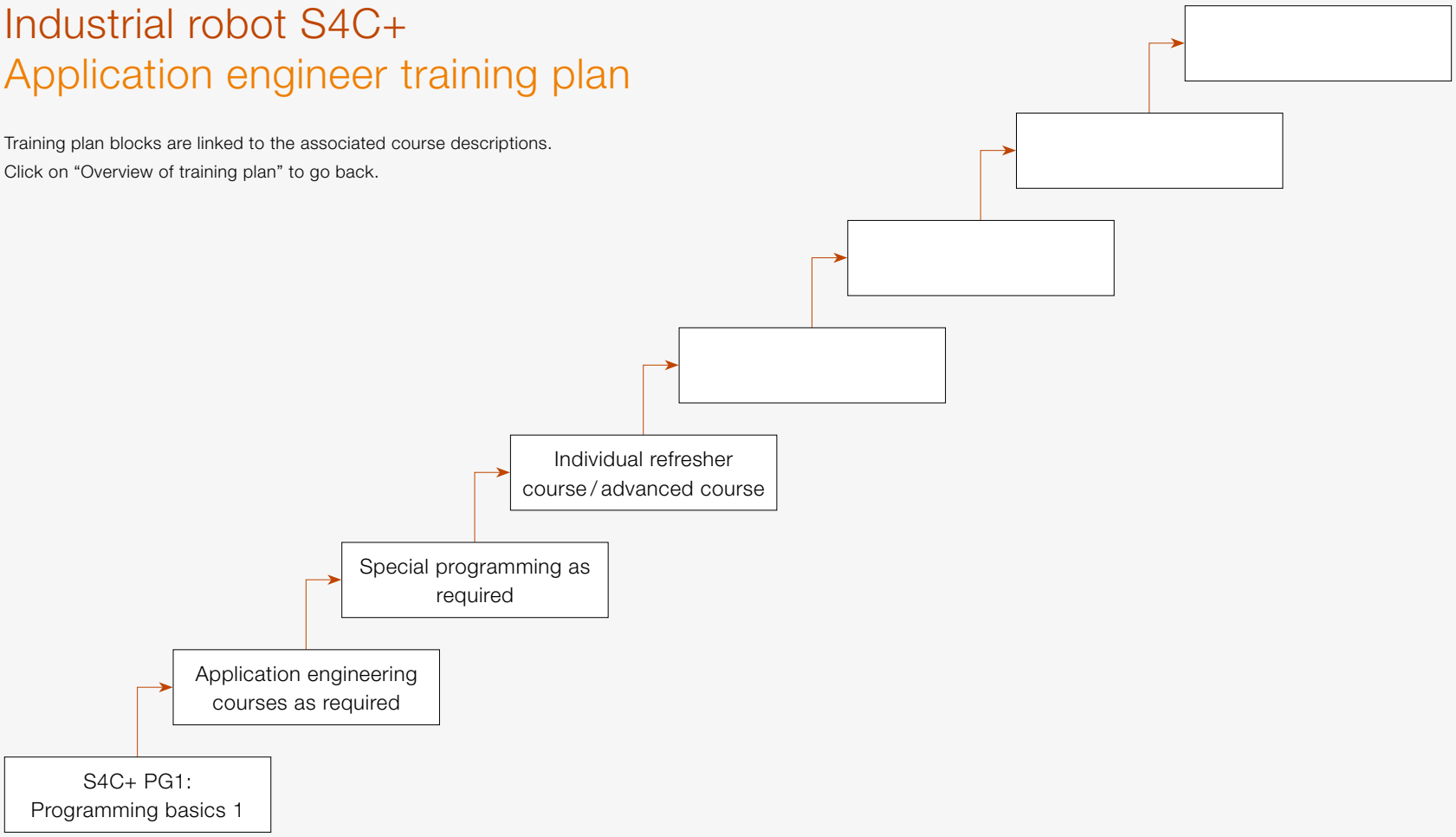
Overview of training plan
1. S4C+ PG1: Programming basics 1
2. S4C+ SE: Electrical appliances course
3. Application engineering courses as required
4. **Special programming as required**
5. Individual refresher course / advanced course

Industrial robot S4C+
Application engineer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4C+ PG1: Programming basics 1

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs

Contents
- Occupational health and safety
- Structure and function of the robot system, dialogue concept of Flexpendant / Robotstudio
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Performing handling tasks
- Programming robot movements and controlling the gripper

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

Contact
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Overview of training plan
1. **S4C+ PG1: Programming basics 1**
2. Application engineering courses as required
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ APT-F: Milling

Target group
Programmers, plant managers

Course goals
– Changing and / or optimising the application

Contents
– Occupational health and safety in dealing with the application
– Training on a milling station
– Producing your own data relevant to the milling process
– Writing and testing application program
– Adjusting and improving milling processes

Prerequisites
– Basic course PG 1 of the corresponding control generation
– Basic computer skills

Information
Course duration: 2 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,300 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. **Application engineering courses as required**
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ PS-C: Conveyor tracking

Target group
Project managers, programmers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Connecting material handling technology to the robot system
- The programming of manufacturing processes with conveyor belt synchronisation
- Individual course goals can be agreed together with the participants

Contents
- Occupational health and safety
- Installation of the additional hardware components such as encoder module, encoder and start signal system
- Determining the corresponding parameters
- Functional testing
- Programming the material handling synchronisation

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,800 EUR / participant

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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

Contact
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Overview of training plan
1. S4C+ PG1: Programming basics 1
2. Application engineering courses as required
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ individual courses

Overview of training plan

Standard courses based on the on-site course programme

Number of days	Price for Monday to Friday	Price for Saturday / Sunday
1	EUR 2,100	EUR 3,150
2	EUR 4,200	EUR 6,300
3	EUR 6,300	
4	EUR 8,400	
5	EUR 10,500	

Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses on site

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

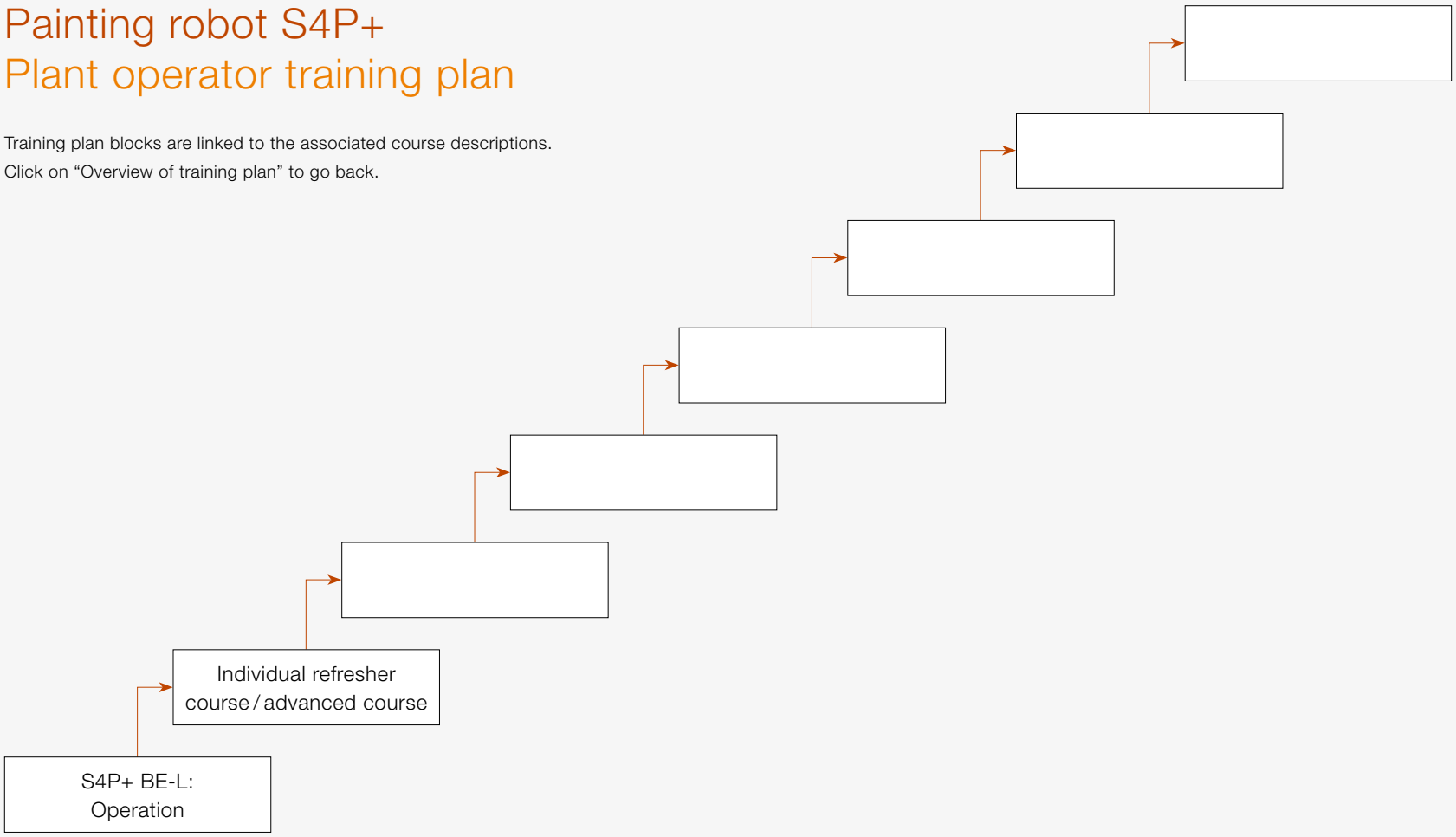
Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours.
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses in the Friedberg Training Center

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

Painting robot S4P+
Plant operator training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ BE-L: Operation painting

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency off),
- Making changes to the painting application

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report
- Changing the fan geometry data and shift points

Prerequisites
None

Information
Course duration: 3 days
Number of participants: three to 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 1,450 EUR/participant

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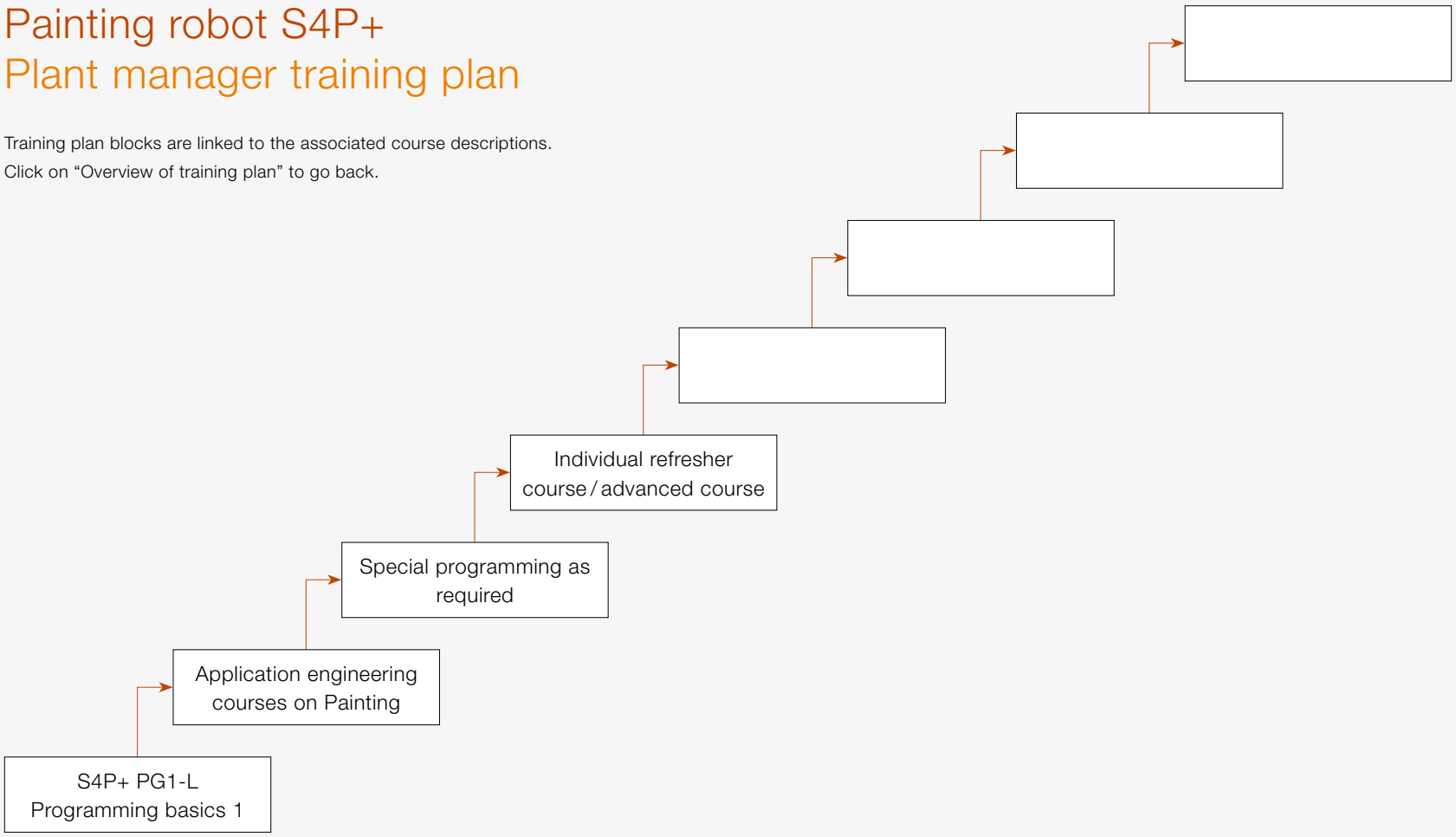
Overview of training plan
1. **S4P+ BE-L: Operation**
2. Individual refresher course / advanced course

Painting robot S4P+
Plant manager training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ PG1-L: Programming basics 1 – Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

Contact
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Overview of training plan
1. **S4P+ PG1-L Programming basics 1**
2. Application engineering courses on Painting
3. Special programming as required
4. Individual refresher course / advanced course

S4P+ APT-L-IPS: Painting – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Practicing the writing of painting programs
- Architecture of the IPS system
- Explaining and understanding IPS configurations (GunControl, open / closed loop, PumpSolution)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Mechanical repairs, error diagnostics of the controls
- Exchanging components
- Calibrating actuators and sensors
- Using a computer to read parameter data via the serial interface
- Diagnosis

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

S4P+ APT-L-CBS: Painting – CartridgeBellSystem

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions and operating method of the CBS system
- Recognising and locating faults in the IPS system (serial interface, visualisation computer)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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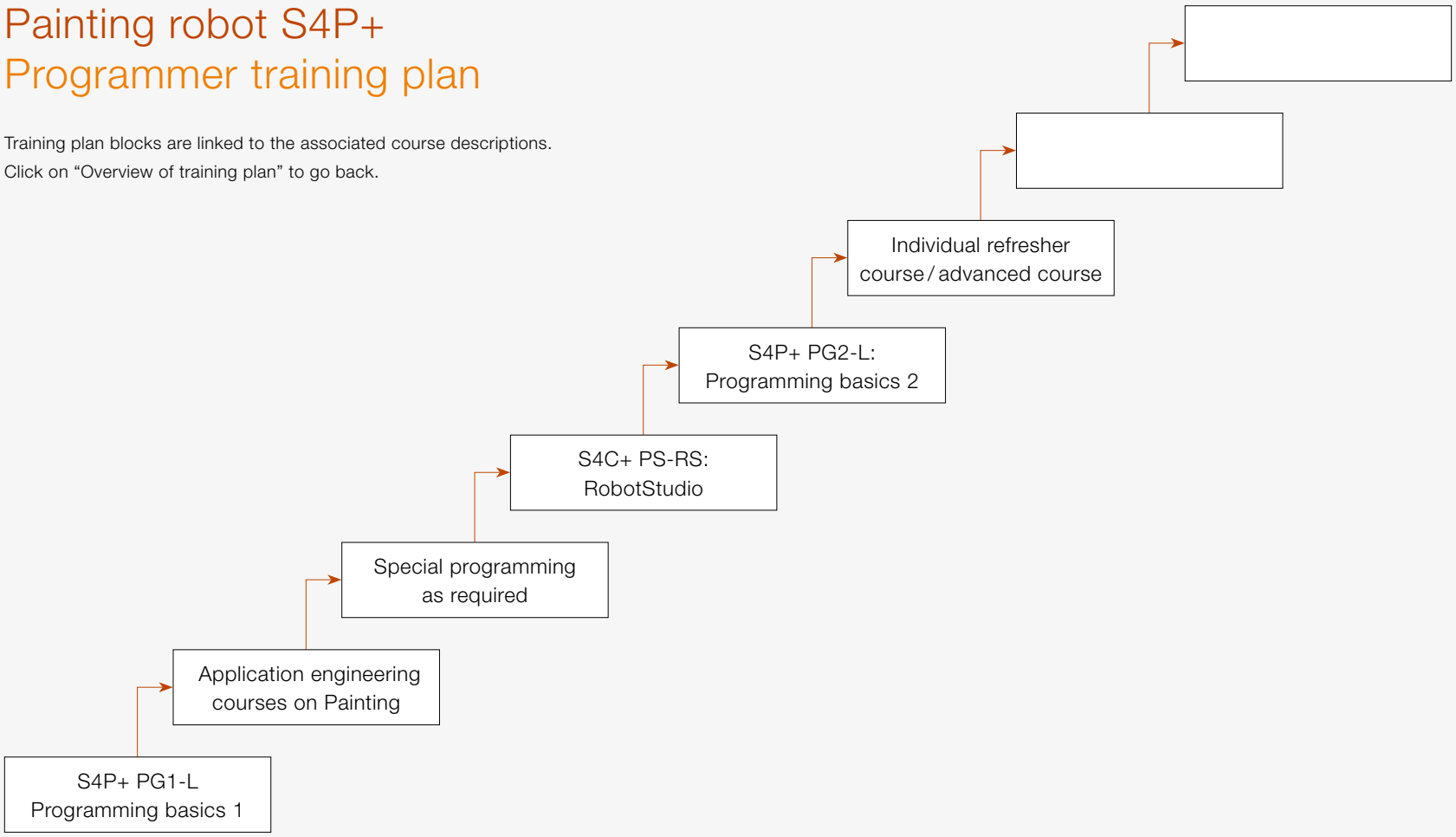
Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

Painting robot S4P+
Programmer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ PG1-L: Programming basics 1 – Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **S4P+ PG1-L Programming basics 1**
2. Application engineering courses on Painting
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4P+ PG2-L: Programming basics 2
6. Individual refresher course / advanced course

S4P+ APT-L-IPS: Painting – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Practicing the writing of painting programs
- Architecture of the IPS system
- Explaining and understanding IPS configurations (GunControl, open / closed loop, PumpSolution)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Mechanical repairs, error diagnostics of the controls
- Exchanging components
- Calibrating actuators and sensors
- Using a computer to read parameter data via the serial interface
- Diagnosis

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. S4P+ PG2-L: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

Contact
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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. S4C+ PS-RS: RobotStudio
5. S4P+ PG2-L: Programming basics 2
6. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. Special programming as required
4. **S4C+ PS-RS: RobotStudio**
5. S4P+ PG2-L: Programming basics 2
6. Individual refresher course / advanced course

S4P+ PG2-L: Programming basics 2 – Painting

Target group
Programmers, plant managers, project managers, planners, start-up engineers

Course goals
- Using the options provided by control for the painting application
- Devising and testing concepts for the optimum use of the system or for solving application tests
- Learning and operating the editing and testing options of robots and the learning program QuickTeach
- The application of a programming tool for editing and testing programs on the computer
- Connecting material handling technology to the robot system
- Programming of manufacturing processes with material handling synchronisation

Contents
- Occupational health and safety
- Conveyor tracking: Connecting the additional hardware components such as encoder module, encoder hardware and start signal system, determining the associated parameters and subsequent functional testing
- Programming with material handling synchronisation, reflecting individual positions and whole routines
- Programming world zones for surveying the working area and defining home zones
- Booting up the system (installation of the operating system)
- Calibrating the measurement system
- Interrupt and multitasking

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

Contact
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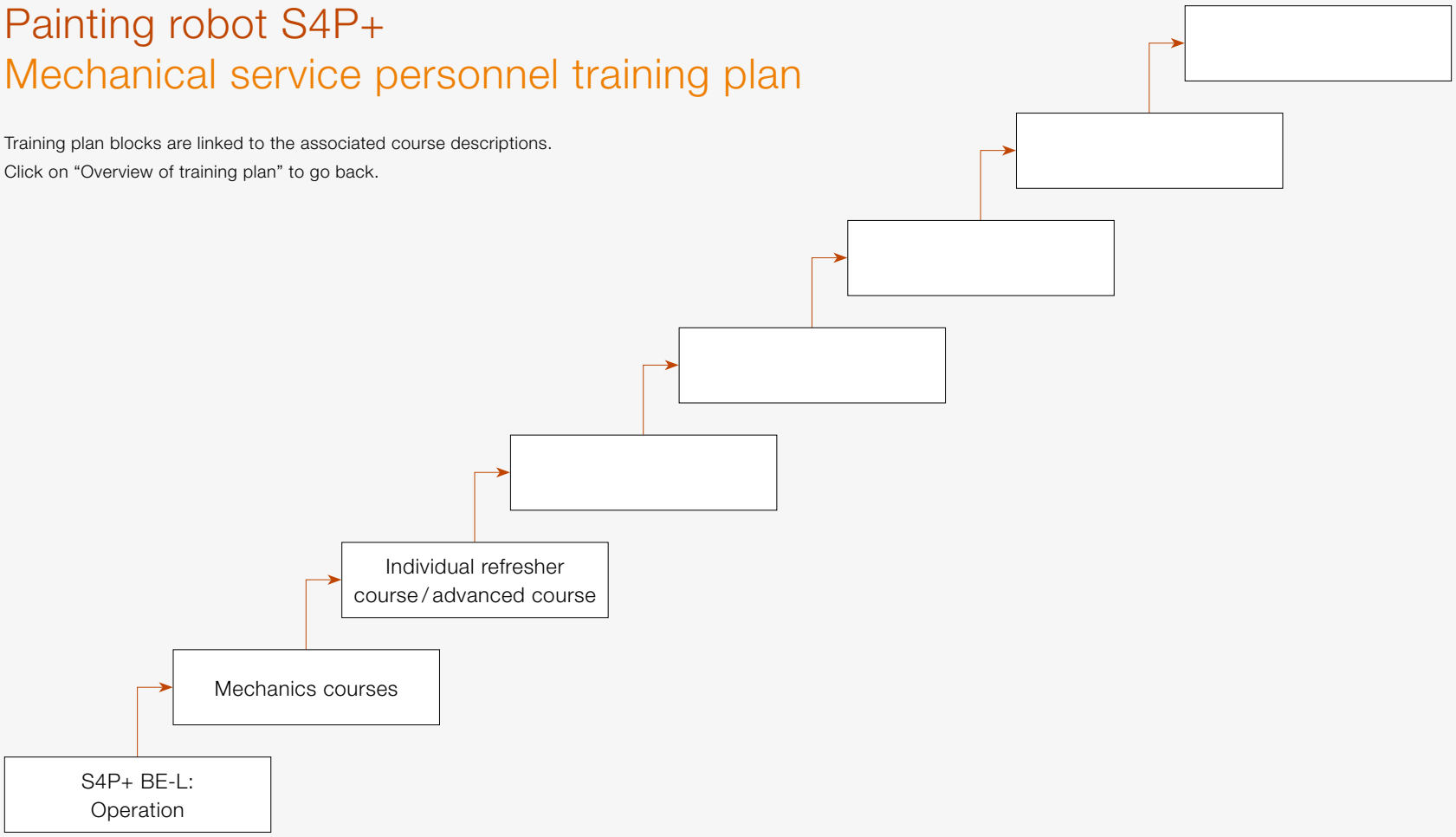
Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. Special programming as required
4. S4C+ PS-RS: RobotStudio
5. **S4P+ PG2-L: Programming basics 2**
6. Individual refresher course / advanced course

Painting robot S4P+
Mechanical service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ BE-L: Operation painting

Target group
Plant operators, mechanics servicing employees, application servicing employees

Course goals
- Independent execution of operating functions
- Switching on and starting up the robot system
- Moving the mechanics with a joystick
- Loading, testing and optimising simple movement programs
- Recognising and rectifying simple faults and service interruptions (e.g. emergency off),
- Making changes to the painting application

Contents
- Occupational health and safety
- Structure and function of the robot system
- Types of movement in manual and automatic operation
- Monitoring input and output signals
- Loading and saving modules and programs
- Error messages and status report
- Changing the fan geometry data and shift points

Prerequisites
None

Information
Course duration: 3 days
Number of participants: three to 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg/Hessen
Price: 1,450 EUR/participant

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Overview of training plan
1. **S4P+ BE-L: Operation**
2. Mechanics Course
3. Individual refresher course / advanced course

S4P+ ME: Mechanics course on robot mechanics IRB 5400-12

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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Overview of training plan
1. S4P+ BE-L: Operation
2. **Mechanics Course**
3. Individual refresher course / advanced course

S4P+ ME: Mechanics course on robot mechanics IRB 5500

Target group
Mechanics servicing employee

Course goals
- Rapid diagnosis of the cause of the error can minimise downtime
- Replacing defective parts in good time
- Maintaining the robot mechanics in accordance with regulations

Contents
- Occupational health and safety
- Backup
- Explanation and functioning of the robot mechanics
- Disassembly and assembly of sub-assemblies and individual parts
- Calibrating robots (fine-calibration)
- Use of special tools
- Testing the robot system
- Performing maintenance and adjustment work

Prerequisites
- Operating course BE or basic course PG 1 of the corresponding control generation
- Bring your own protective shoes and work clothes

Information
Course duration: 4 days
Number of participants: 3 – 4 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,400 EUR / participant

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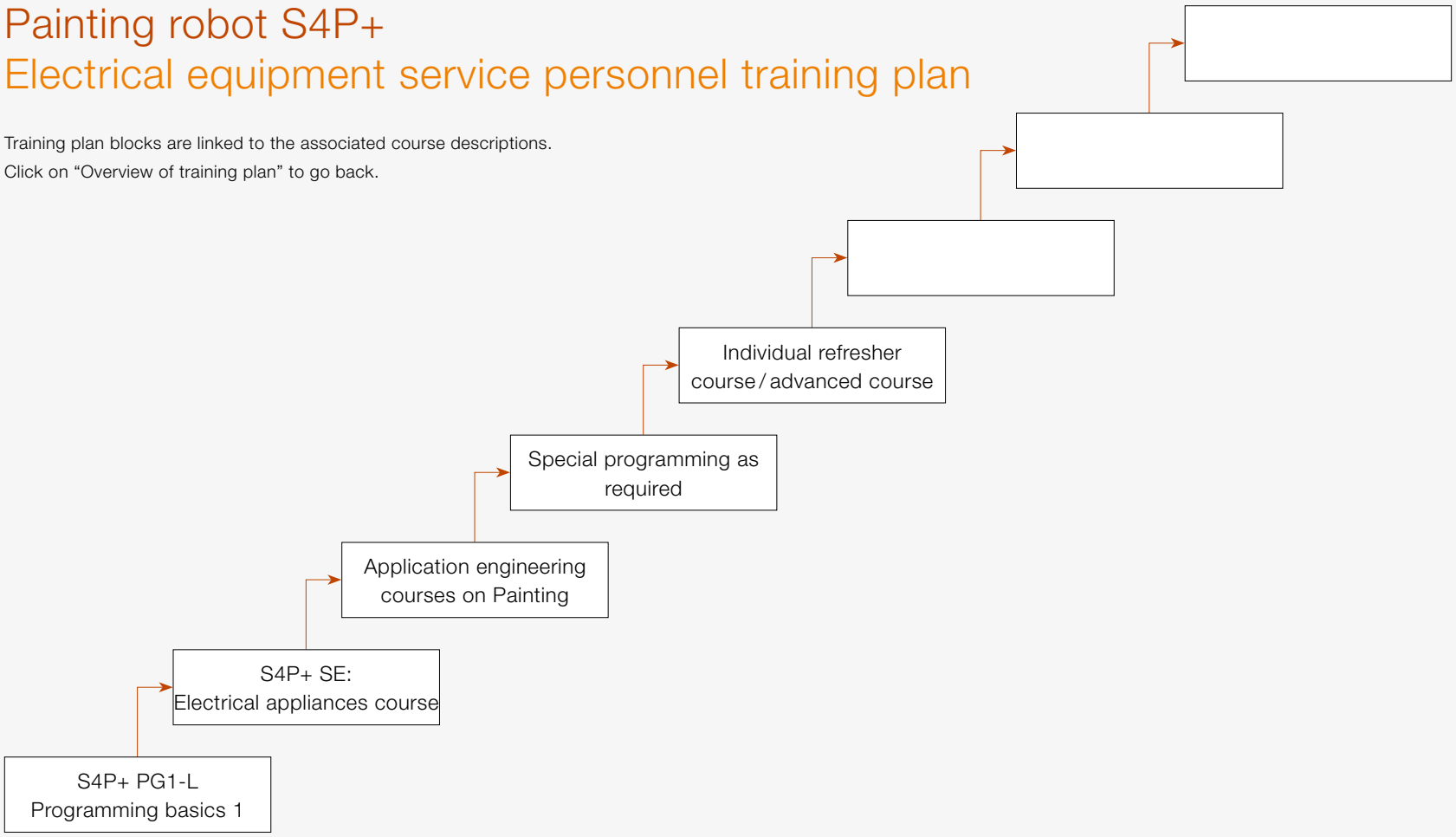
Overview of training plan
1. S4P+ BE-L: Operation
2. **Mechanics Course**
3. Individual refresher course / advanced course

Painting robot S4P+
Electrical equipment service personnel training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ PG1-L: Programming basics 1 – Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. **S4P+ PG1-L Programming basics 1**
2. S4P+ SE: Electrical appliances course
3. Application engineering courses on Painting
4. Special programming as required
5. Individual refresher course / advanced course

S4P+ SE: Electrical appliances course

Target group
Commissioning employee, electrical appliances servicing employee

Course goals
- System overview
- Locating system faults
- Rapid diagnosis of the cause of the error can minimise downtime

Contents
- Occupational health and safety
- Detailed explanation of structure and working method of the control of the robot, particularly the ex protection
- Program errors and how to recognise them
- System parameters: Meaning, change, backup
- Checking calibration, updating revolution counter, fine-calibration
- Working with circuit diagrams
- Practical exercises for error recognition, systematic error diagnostics
- Producing a system, installation of the control software
- Loading and executing test programs

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills
- Electrical engineering qualification

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,550 EUR / participant

Contact
Claudia Pleimfeldner
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roboterservice.schulung@de.abb.com

Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. **S4P+ SE: Electrical appliances course**
3. Application engineering courses on Painting
4. Special programming as required
5. Individual refresher course / advanced course

S4P+ APT-L-IPS: Painting – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Practicing the writing of painting programs
- Architecture of the IPS system
- Explaining and understanding IPS configurations (GunControl, open / closed loop, PumpSolution)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Mechanical repairs, error diagnostics of the controls
- Exchanging components
- Calibrating actuators and sensors
- Using a computer to read parameter data via the serial interface
- Diagnosis

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
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2. S4P+ SE: Electrical appliances course
3. **Application engineering courses on Painting**
4. Special programming as required
5. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
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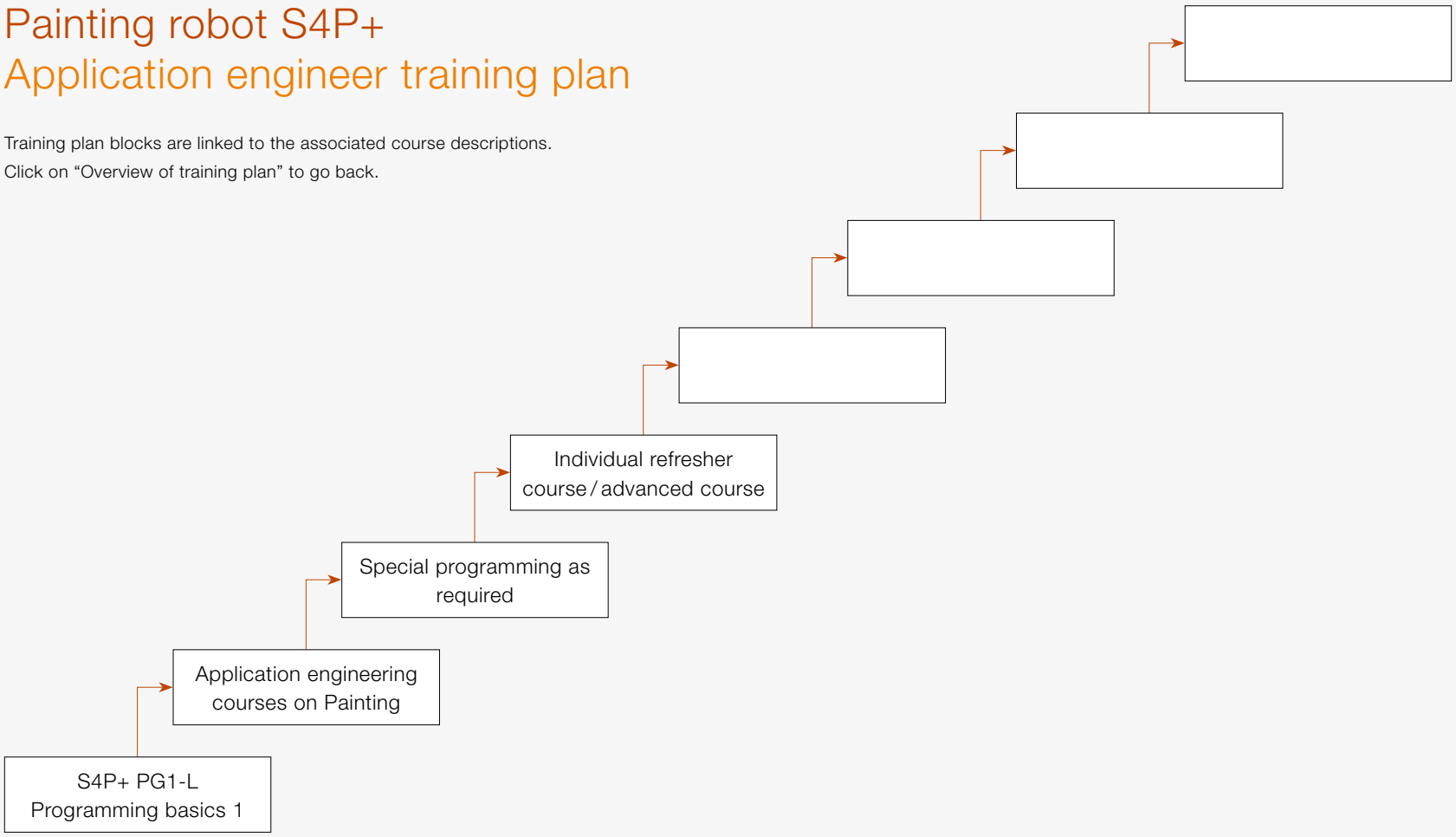
2. S4P+ SE: Electrical appliances course
3. Application engineering courses on Painting
4. **Special programming as required**
5. Individual refresher course / advanced course

Painting robot S4P+
Application engineer training plan

Training plan blocks are linked to the associated course descriptions.
Click on “Overview of training plan” to go back.



S4P+ PG1-L: Programming basics 1 – Painting

Target group
Programmers, plant managers, project managers, planners, electrical appliances servicing employees

Course goals
- Independent execution of operating functions
- Independently developing, implementing, testing, optimising and documenting simple movement programs
- Changing and / or optimising the application

Contents
- Occupational health and safety
- Structure and function of the robot system
- RAPID program structure
- Types of movement in manual and automatic operation
- Writing simple movement programs
- Monitoring input and output signals
- Measuring tool and plant object
- Loading and saving modules and programs and system parameters
- Error messages and status report
- Backup
- Programming with conveyor tracking
- Programming with the processware “Paintware”

Prerequisites
Basic computer skills

Information
Course duration: 5 days
Number of participants: 3 – 6 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
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2. Application engineering courses on Painting
3. Special programming as required
4. Individual refresher course / advanced course

S4P+ APT-L-IPS: Painting – Integrated Prozess System

Target group
Programmers, plant managers, project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Using the IPS system and controlling the functions
- Making the necessary calibrations after exchanging components or when using new application media
- Controlling painting processes; maintaining and configuring the control system
- Changing and / or optimising the application

Contents
- Occupational health and safety in dealing with the application
- Practicing the writing of painting programs
- Architecture of the IPS system
- Explaining and understanding IPS configurations (GunControl, open / closed loop, PumpSolution)
- Extending and optimising the existing IPS configuration
- Parametrisation of controllers
- Mechanical repairs, error diagnostics of the controls
- Exchanging components
- Calibrating actuators and sensors
- Using a computer to read parameter data via the serial interface
- Diagnosis

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 5 days
Number of participants: 4 persons
Maximum: 4 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,900 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

S4P+ APT-L-CBS: Painting – CartridgeBellSystem

Target group
Application mechanics, start-up engineers, mechanics servicing employees

Course goals
- Using the IPS system and controlling the functions
- Performing necessary maintenance, replacing components or worn parts, servicing and error diagnostics
- Making the necessary calibrations on mechanical components
- Making changes to the application

Contents
- Occupational health and safety in dealing with the application
- Getting to know the functions and operating method of the CBS system
- Recognising and locating faults in the IPS system (serial interface, visualisation computer)
- Exchanging hardware components and the associated adjustments
- Functional testing of the hardware components
- Performing settings and calibrations
- Using and understanding maintenance instructions
- Performing possible repairs on the hardware components

Prerequisites
Basic course PG 1 of the corresponding control generation

Information
Course duration: 3 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 1,950 EUR / participant

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Overview of training plan
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2. **Application engineering courses on Painting**
3. Special programming as required
4. Individual refresher course / advanced course

S4C+ PS-M: Multitasking

Target group
Project managers, planners, start-up engineers, electrical appliances servicing employees

Course goals
- Getting to know and programming the functionality of controls when applying the option of Multitasking

Contents
- Occupational health and safety
- Functioning of the controls in Multitasking
- Storage structure and structure of system parameters
- Programming and integrating background tasks
- Synchronisation of a foreground and background task
- Using joint data elements
- Using interrupt programming
- Sequence chains and dispatcher programming
- Creating a background task with different priorities
- Proposed solutions

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Basic computer skills

Information
Course duration: 4 days
Number of participants: 3 persons
Maximum: 3 persons per training robot
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,300 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

S4C+ PS-RS: RobotStudio

Target group
Planners, start-up engineers, programmers, project managers

Course goals
- Carrying out and visualising complex control tasks of a robot system with the help of the offline tool RobotStudio
- Writing a program without direct intervention in the robot (offline)

Contents
- Occupational health and safety
- Basic geometric design
- Importing geometric data
- Library functions
- Moving virtual robots, programming positions and writing programs
- Creating a tool
- Creating robot positions with geometric data
- Using a plant object
- Using the virtual FlexPendant for the manual movement of the robot and for changing the RAPID program
- Using external axes
- Producing graphic and geometric functions, as well as detail levels

Prerequisites
- Basic course PG 1 of the corresponding control generation
- Advanced computer skills
- Experience with a CAD program

Information
Course duration: 4 days
Number of participants: 3 – 6 persons
Dates: subject to agreement
Venue: Training Center in Friedberg / Hessen
Price: 2,100 EUR / participant

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Overview of training plan
1. S4P+ PG1-L Programming basics 1
2. Application engineering courses on Painting
3. **Special programming as required**
4. Individual refresher course / advanced course

S4P+ individual courses

Overview of training plan

Standard courses based on the on-site course programme

Number of days	Price for Monday to Friday	Price for Saturday / Sunday
1	EUR 2,100	EUR 3,150
2	EUR 4,200	EUR 6,300
3	EUR 6,300	
4	EUR 8,400	
5	EUR 10,500	

Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses on site

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

Each course on the first day from 1.00 pm to the last day at 1.00 pm, approx. 30 hours.
Optional: Starts on the first day at 8.00 am if you book an additional half trainer day
Optional: Ends on the last day at 5.00 pm if you book an additional half trainer day

Individual courses in the Friedberg Training Center

Number of days	Price for Monday to Friday	Price for Saturday/Sunday
1	EUR 2,300	EUR 3,450
2	EUR 4,600	EUR 6,900
3	EUR 6,900	
4	EUR 9,200	
5	EUR 11,500	

Training prices 2013

Courses	Duration (days)	Price (Euro)
Industry robot IRC5		
IRC5: Introductory course – Industrial robots	2	950
IRC5 BE: Operating	3	1,250
IRC5 PG1: Programming basics 1	5	1,950
IRC5 PG2: Programming basics 2	5	2,050
IRC5 PG3: Programming basics 3	5	2,150
IRC5 Upgrade Workshop: Robot specialists	4	2,300
IRC5 APT-F: Milling	2	1,300
IRC5 APT-KS: Adhesion and sealing	2	1,300
IRC5 APT-KS-IPS: Adhesion & sealing of Integrated Process System	4	2,300
IRC5 APT-KS-A: Adhesion, sealing and application	3	1,800
IRC5 APT-P: Spot welding	2	1,300
IRC5 APT-RB: Roller beading	3	1,800
IRC5 APT-S1: Shielded arc welding 1	3	1,800
IRC5 APT-S1: Shielded arc welding 2	5	2,500
IRC5 PS-A: Plant operation	4	2,300
IRC5 PS-C: Conveyor tracking	3	1,800
IRC5 PS-EPS: ElectronicPositionSwitches	2	1,300
IRC5 PS-EPS+S: ElectronicPositionSwitches and SafeMove	4	2,300
IRC5 PS-HPR: HomePosRunning	3	1,800
IRC5 PS-I: Initiation	4	2,300
IRC5 PS-M: Multitasking	4	2,300
IRC5 PS-FCM: Force Control for Machining	5	2,500

Courses	Duration (days)	Price (Euro)
IRC5 PS-MMV-K: MultiMove – Configuration	2,5	1,500
IRC5 PS-MMV-P: MultiMove – Programming	2,5	1,500
IRC5 PS-PM: PickMaster (Price for complete course)	5	9,600
IRC5 PS-RS: RobotStudio	4	2,100
IRC5 PS-S: SafeMove	3	1,800
IRC5 PS-X: Programming and configuring external axes	5	2,500
IRC5 PS-XP: Programming external axes	3	1,800
IRC5 SE Electrical appliances course	5	2,300
IRC5 SD: Fault and Diagnostics	2,5	1,500
IRC5 ME 120: Mechanics	3	1,900
IRC5 ME 140: Mechanics	3	1,900
IRC5 ME 1600 / 1600ID: Mechanics	4	2,400
IRC5 ME 2400: Mechanics	3	1,900
IRC5 ME 2600 / 2600 ID: Mechanics	4	2,400
IRC5 ME 360: Mechanics	3	1,900
IRC5 ME 4400: Mechanics	3	1,900
IRC5 ME 4400 FP: Mechanics	4	2,400
IRC5 ME 4600: Mechanics	4	2,400
IRC5 ME 4600 FP : Mechanics	4	2,400
IRC5 ME 6600: Mechanics	5	2,900
IRC5 ME 6600 FP / 7600 FP: Mechanics	5	2,900
IRC5 ME 6640: Mechanics	5	2,900
IRC5 ME 6640 FP: Mechanics	5	2,900
IRC5 ME FP: Mechanics	2	1,300

Training prices 2013

Courses	Duration (days)	Price (Euro)
Painting robot IRC5P		
IRC5P: Introductory course – Paint robots	2	950
IRC5P BE-L: Operating painting	3	1,450
IRC5P PG1-L: Programming basics 1 for painting	5	2,300
IRC5P PG2-L: Programming basics 2 for painting	5	2,400
IRC5P APT-L-IPS: Painting – Integrated Process System	4	2,350
IRC5P APT-L-CBS: Painting – CartridgeBellSystem	3	1,950
IRC5P APT-L-KA: Painting – Conventional application	3	1,950
IRC5P SE-L: Electrical appliances	5	2,550
IRC5P SD: Fault and Diagnostics	3	1,800
IRC5P ME 52: Mechanics	3	1,900
IRC5P ME 5400: Mechanics	4	2,400
IRC5P ME 5500: Mechanics	4	2,400
Industrial robot S4C+		
S4C+ BE: Operating	3	1,250
S4C + PG1: Programming basics 1	5	1,950
S4C + PG2: Programming basics 2	5	2,050
S4C+ APT-F: Milling	2	1,300

Courses	Duration (days)	Price (Euro)
S4C+ PS-C: Conveyor tracking	3	1,800
S4C+ PS-M: Multitasking	4	2,300
S4C+ PS-RS: RobotStudio	4	2,100
S4C+ SE Electrical appliances course	5	2,300
S4C+ ME 140: Mechanics	3	1,900
S4C+ ME 2400: Mechanics	3	1,900
S4C+ ME 4400: Mechanics	3	1,900
S4C+ ME 6600: Mechanics	5	2,900
Painting robot S4P+		
S4P BE-L: Operating painting	3	1,450
S4P+ PG1-L: Programming basics 1 painting	5	2,300
S4P+ PG2-L: Programming basics 2 painting	5	2,400
S4P+ APT-L-IPS: Painting – Integrated Process System	5	2,900
S4P+ APT-L-CBS: Painting – CartridgeBellSystem	3	1,950
S4P+ SE-L: Electrical appliances	5	2,550
S4P+ ME 5400: Mechanics	4	2,400
S4P+ ME 5500: Mechanics	4	2,400

General course conditions of the ABB Training Center Friedberg

ABB Automation GmbH
Unternehmensbereich Robotics
Grüner Weg 6, 61169 Friedberg, Germany

1 General remarks

1.1 "Customer" refers to the business person in whose name the seminar was booked.

1.2 "Participant" refers to the natural person who is registered for the seminar or is taking part in the seminar.

1.3 Insofar as these conditions include obligations of the participant, the customer for whom the participant is taking part is completely responsible for ensuring their fulfilment.

1.4 For the course on servicing electrical appliances, as well as for certain individual courses (depending on their requirements), the customer must have a professional electro-technical qualification.

1.5 Participants of mechanics courses or combined operation/mechanics courses must bring their own protective clothing (protective shoes and work clothes).

1.6 The customer is aware that without the prerequisites specified in the seminar programme, the learning goal of a seminar is difficult or impossible to achieve. The customer shall therefore ensure that their appointed participant fulfils these prerequisites.

1.7 If a course participant significantly hinders the progress of the course for the aforementioned reasons, ABB reserves the right to ban the course participant from the course for the sake of other course participants.

2 Registration for the seminars and course venue

2.1 For organisational reasons, the registration must be made in writing. The following information is required: First and last names, as well as complete address with telephone and fax number of the participant, complete name of the customer's company (if it deviates from that of the participant), name of the seminar and the seminar date.

2.2 Unless stated otherwise in the course description and confirmation, the seminars are held in the Training Center of ABB Automation GmbH, Unternehmensbereich (business unit) Robotics in Grüner Weg 6, 61169 Friedberg, Germany.

2.3 Insofar as the parties agree that the training shall be held on the customer's premises, the "Course conditions for courses on the customer's premises" take priority over these conditions.

2.4 Upon registration, the terms and conditions of business become part of the contract and are acknowledged as legally binding.

3 Data protection

3.1 The customer grants his consent for his data to be processed insofar as this serves the purpose of the legal relationship.

4 Course times

4.1 The course times are as follows: We begin at 10:00 am on the first day. Seminars end daily at 4:30 pm, except on Friday which ends at 1:30 pm. Half-day courses end at 12:30 pm.

5 Confirmation

5.1 ATG/R confirms the receipt of the registration/order (confirmation of receipt) with a registration confirmation. Registrations are dealt with in the order they are received.

5.2 Registrations and registration cancellations are only processed in Friedberg by the training department.

6 Seminar prices

6.1 Please refer to the current price list for the prices. The prices are net prices and are excluding the respectively valid value added tax.

6.2 ATG/R seminar prices include the costs for the use of the required technical equipment and accompanying material. The scope of service is specified in the seminar description or, for customer-specific training courses, in the individually defined agreements.

6.3 Other costs in connection with the seminar and the seminar participation (in particular travel and overnight costs) shall be borne by the participant or the customer. Failure to participate or only partial participation in a seminar does not entitle the participant to a price reduction.

7 Conditions of payment

7.1 The seminar price must be paid in full after the seminar and on receipt of the ATG/R invoice.

8 Customer cancellation

8.1 Cancellations of seminars must be made in writing. In the event of cancellation up to six weeks before the seminar date, the customer shall not be charged. In the event of cancellation up to 14 days before the seminar date, the customer shall be charged 50 percent of the seminar price. In the event of a later cancellation, the customer shall be charged the full seminar price. The customer is however given the option of appointing a participant to take his place.

9 Cancellation/Postponement by ATG/R

9.1 ATG/R reserves the right to change the date and venue or cancel the seminar, even if a registration confirmation has already been issued, in the event of insufficient demand, insufficient participants, speaker cancellations, force majeure or for other important reasons that are not the fault of ATG/R. The affected participants shall be informed without delay and, wherever possible, shall be offered alternatives. In the event of cancellation or postponement of the seminar for one of the aforementioned reasons, no claims for damages may be asserted against ATG/R.

10 Liability disclaimer and indemnity

10.1 The information communicated in the seminar and contained in the accompanying materials, including all handed over data carriers, are didactically and expertly prepared by ATG/R to the best of their knowledge and belief. ATG/R accepts no liability for any errors in the information as defined in clause 1, nor for any resulting damages, in particular consequential damages.

10.2 Irrespective of the above 8.1, customer claims for damages and reimbursement of expenses (hereinafter referred to as claims for damages), for whatever legal reason, in particular due to violation of duties from the obligatory relation and for impermissible actions, are excluded. This does not apply for compulsory liability, e.g. in accordance with the Produkthaftungsgesetz (German Product Liability Act), in the case of intent, gross negligence, injury to life, limb or health or violation of cardinal contract duties. Claims for damages for violation of fundamental contractual obligations are however limited to foreseeable damages that are typical for the contract, insofar as there is no liability as a result of intent, gross negligence or injury to life, limb or health. A change to the onus

of proof to the detriment of the customer is not associated with the aforementioned stipulations.

10.3 Note: In the service course on electrical appliances, work is performed on live parts with voltages exceeding 42 volts. ABB shall accept no responsibility for accidents resulting from failure of the participant to observe the occupational health and safety regulations.

10.4 Further, ATG/R shall accept no liability for improper dealing of the premises and training appliances at the seminar venue and/or on the customer's own systems. In this context, liability is excluded for consequential damages as a result of incorrect operation by ATG/R trainers or participants. The customer must indemnify ATG/R against all claims of third parties that are asserted against ATG/R in connection with the aforementioned damages, and must fully reimburse ATG/R for all incurred costs and and expenses.

11 Accompanying materials

11.1 The documents reflect the status at the time of the seminar. ATG/R accepts no liability nor guarantees that the information shall remain valid.

11.2 ATG/R reserves all rights, including those of translation, reprint and reproduction of the accompanying materials or parts thereof. These may not be reproduced, forwarded to or processed by third parties, distributed or redesigned in Germany or abroad without the written consent of ATG/R. The software in the seminar rooms is copyrighted and may neither be copied nor removed.

12 Certificate

12.1 At the end of the course, the participant's qualification will be confirmed with the issuance of a certificate. Participants who are unable to follow the course content due to insufficient prior knowledge or comprehension difficulties will receive a confirmation of participation.

13 Other remarks

13.1 If the customer is a businessman, the sole legal venue for all disputes arising directly or indirectly from the contractual relationship is Mannheim. ATG/R is however also entitled to file a lawsuit at the customer's location.

13.2 German substantive law, with the exclusion of the Convention of International Sale of Goods (CISG), applies for the legal relationships in connection with this contract.

13.3 Should any individual provision or any part of any provision be or become void, illegal or unenforceable, the validity of the remaining provisions hereof shall in no way be affected. This does not apply if maintaining the contract would constitute unreasonable hardship for one of the parties.

Course conditions for courses on customer's premises

The following prerequisites must be fulfilled by the customer:

Occupational health and safety at the training venue

- For reasons of occupational health and safety, the following conditions must be fulfilled by the customer.
- Secure attachment of the robot to the ground
- Sectioning off the robot movement area
- External emergency stop devices
- Observation of all valid occupational health and safety regulations.

Training robot equipment

- For mechanical and electrical equipment courses, the customer must discuss the suitability of the training equipment with ABB
- One robot system is required for one to three course participants
- Two robot systems are required for four to six course participants
- Three robot systems are required for seven to nine course participants
- Corresponding control generation
- Corresponding handling parts
- Storage positions
- On / off unit for six signals

Training room

The training room:

- Must be located in the proximity of the training robot
- Should be available for the entire duration of the course
- Should be lockable

Production equipment risks to be borne by the customer for the course

ABB expressly points out that training courses bear risks for customer material / equipment, such as but not limited to:

- Collision when moving by hand or using the program; the gripper or another tool may become damaged or destroyed.
- Defects to parts such as components on the safety circuit board; under circumstances a replacement circuit board might not be available.
- Loss of data: There is no up-to-date backup or it was not verified that data is available for the complete installation of a system (system key and installation files).

Continuation of the training in the event of damage / breakdown of equipment

In the case of damage occurring to customer material or equipment failure, the following applies:

- Only the theoretical sections of the training plan can be continued.
- In consultation with the training management, the trainer can interrupt the training course and use the training time to carry out repairs.
- There is no entitlement to a repetition of the missing sections of the training course or to additional training hours.

Responsibility of the customer for damages and breakdowns during training

The customer bears the risks and costs for all damage and failure of their own equipment during the training course, as well as the inability to achieve the training goal as a result. These risks include, but are not limited to, the following:

- Production downtime as a result of a plant error during the training course
- Necessity to repeat the course
- Defects and damage to customer material / equipment
- Cost of repairs, spare parts, use of maintenance personnel, etc.

Selection of hotels and guest houses

When booking your hotel, please mention that you will be attending a training session at ABB. Some of the hotels and guest houses grant special conditions for such bookings.

Name and adress	Distance	Price (€)*	Telephon and fax
Dorheimer Hof (Dorheim part of town) Wetterauerstr. 70 61169 Friedberg www.dorheimerhof.de	5,7 km	from 56,50	Tel. 0 60 31 73 70 0 Fax 0 60 31 73 70 40
Hotel Stadt Friedberg (Stadthalle) Am Seebach 2 61169 Friedberg www.hotel-stadt-friedberg.de	1,5 km	from 66,–	Tel. 0 60 31 60 70 Fax 0 60 31 60 71 00
Sportpark Bad Nauheim In der Aue 30–32 61231 Bad Nauheim www.sportpark-badnauheim.de	3,6 km	from 83,–	Tel. 0 60 32 40 04 Fax 0 60 32 18 15
Hotel "Zur Traube" Niddaer Gasthofbrauerei Markt 21 63667 Nidda www.hotel-zur-traube.de	27,9 km	from 46,–	Tel. 060 43 / 40 47-0 Fax 0 60 43 / 40 47-10
Pension Villa Monje (guest house) William-Kerckhoff-Str. 2 61231 Bad Nauheim	6,0 km	from 40,–	Tel. 0 60 32 8 17 50
Hotel Bayerischer Hof Mittelstraße 17 61231 Bad Nauheim	4,9 km	from 55,–	Tel. 0 60 32 91 10-0 Fax 0 60 32 91 10-20

Name and adress	Distance	Price (€)*	Telephon and fax
Hotel Arfromella Garni William-Kerckhoff- Str. 3–4 61231 Bad Nauheim www.arfromella-badnauheim.de	6 km	from 59,–	Tel. 0 60 32 96 07-0 Fax 0 60 32 96 07-36
Hotel Brunnenhof Garni Ludwigstr.13 61231 Bad Nauheim www.brunnenhof-hotel-garni.de	5,9 km	from 65,–	Tel. 0 60 32 9 29 00 Fax 0 60 32 54 08
Hotel Lindemann Garni Frankfurter Straße 95 61231 Bad Nauheim www.hotel-lindemann.de	6,3 km	from 59,–	Tel. 0 60 32 96 66-5 Fax 0 60 32 96 66-40
Hotel Spöttel Luisenstraße 5–7 61231 Bad Nauheim www.spoettel-badnauheim.de	5,6 km	from 60,–	Tel. 0 60 32 93 04-0 Fax 0 60 32 93 04-59
Best Western Hotel Rosenau **Steinfurther Straße 1–5** 61231 Bad Nauheim www.best-western-rosenau.de	6,7 km	from 70,50	Tel. 0 60 32 96 46-0 Fax 0 60 32 96 46-666
Dolce Am Kurpark Nördlicher Park 16 61231 Bad Nauheim www.dolce-bad-nauheim-hotel.de	6,0 km	from 99,–	Tel. 0 60 32 30 30 Fax 0 60 32 30 34 19

* Single room, prices subject to change

How to find us

Directions via the A45

Exit the A45 at “Florstadt” and drive in the direction of Friedberg. After the town entrance sign, turn left after the pedestrian traffic lights in the direction of “Industriegebiet Grüner Weg” (industrial area). Follow the main road through the “Industriegebiet Süd” (industrial area) up to the traffic lights crossing. Turn right in the direction of B3 Gießen. At the second lights, turn left into Grüner Weg. ABB is on the left-hand side.

Directions via the A5

Exit the A5 at “Friedberg” and drive in the direction of Friedberg, past Rosbach v.d.H. Shortly before the town entrance sign for Friedberg, turn right at the roundabout into Grüner Weg. ABB is on the right-hand side.

Directions via the B3

Drive on the bypass up to the “Friedberg West” exit/Industriegebiet Grüner Weg (industrial area). Shortly before the town entrance sign for Friedberg, turn right at the roundabout into Grüner Weg. ABB is on the right-hand side.

Getting there by public transport

Travel to Hauptbahnhof Friedberg (main station). There are taxis at the station.

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