1 ARCITEC Arc Welding System Description

1.1 Introduction

The description in this document is valid for ARCITEC combined with the S4Cplus robot controller.

ARCITEC is a system solution where the robot controller and the weld power source are highly integrated. Typical features are:

- The welding power source and the robot controller communicate through a fast CAN/Devicenet bus.
- All programming is done from the robot Teach Pendant. One window in the Teach Pendant is called Schedule Manager. This is where schedules for the power source are programmed. A schedule contains all data for the power source performance. A number of maximum 99 schedules can be stored.

The schedule data components and the schedule programming are described in this manual, the section Programming.

- There are two alternative power sources in the ARCITEC concept:
  - The LRB 400, which is physically integrated with the robot controller cabinet. This solution is saving workshop floor area.
  - The LRC 430, which physically stands alone beside the robot control cabinet. This solution allows a weld current output that is higher than LRB 400.

- The welding processes presently performed by ARCITEC are GMAW/short arc, spray arc and short-pulsed arc.

- The ARCITEC-based power source has a built-in database and calculation tool for weld parameter values. The features of this synergic function are described below.
1.2 ARCITEC Hardware

The pictures below show the ARCITEC hardware:

Figur 1  ARCITEC Hardware LRB400 and LRC430.
1.3 Process Control - Chart of Communication

In the ARCITEC solution the sub systems interacting for the welding control are uniquely dedicated and deeply integrated into one system:

![Diagram of ARCITEC Arc Welding System]

1.4 Main Process Tasks

The robot controller administrates the welding on a superior level. In the program it synchronizes the weld process with the rest of the program sequence, robot motion (and sometimes workpiece reorientation), interrupt handling, etc.

Welding tasks that the robot controller performs from the program sequence without co-operation with the power source:

- All gas timers
- Some optional start functions (restart motion, scrape start motion, motion delay time and heat time/distance)
- Weld speed
- Weaving parameters
- Weld delay distance
- Cool and fill time (for the robot controlled crater fill)
Welding tasks that the power source performs on command from the robot controller:

- Activation of schedules (to be used during different phases of the weld)
- Weld start and stop

An acknowledge message will be sent back from the **Weld Data Unit** to the robot controller to let the program sequence continue when the process is:

- Stabilized after a weld start command
- Turned off after a weld stop command

In the Weld Data Unit the process is administrated, which includes sending schedule data to the **PowerUnit** and to the **Process Interface Board**. The latter is fitted in the **Interface Cabinet** on top of the robot control cabinet. The Process Interface Board is the direct controller of the wire feed speed.

The power source performs the direct weld voltage and current control, thus supplies electric power to the welding process. The voltage and current performance of the power source is dependant on the built-in dynamic properties and the contents of the activated schedule.

In the Weld Data Unit the process data base is kept and synergic data are calculated.

### 1.5 Interaction User – Machine for Synergic Data

The result from the calculation in the synergic function is called a **synergic line**. Such a line is in reality a multi dimensional relationship of matching data.

When a schedule is set to **synergic mode**, data suitable for a stable, balanced process are easy to access:

- The user/programmer selects weld method, wire material and dimension, gas composition and wire feed speed.
- The system selects schedule values like voltage, pulse components and other parameters affecting the process dynamics.

The synergic lines does not take into account the used wire extension or the gun angles in a customer application. Yet, the suggested values will be close to the requirements of many applications. The synergic data are a good starting point also when the application requires additional data adjustment.

Further information in this manual, section *Programming*. 
1.6 Supervision Facilities

Equipment state and process state are supervised by the system. Current process data values are presented on the Teach Pendant screen.

Exceptions that might occur are reported in such a way that the programmer/user can take care of them.

1.7 RobotWare Requirements

For ARCITEC-based power sources the RobotWare option Arcitec must be installed.

For the Process Interface Board the RobotWare option IO plus must be installed.

1.8 Options

- **CAN-Assist** is an optional multi purpose PC tool. A customer might be interested in using this tool for the definition of synergic lines. Other functions are for service purposes.

- Software modules for low frequency, thermal pulsing, one of which is synchronized with weaving, are options that interact excellently with the basic features of ARCITEC.

1.9 Service Functions

A number of service functions can be reached from the Schedule Manager. It might for example be useful to know/report the program version of the power source. How to use this is described in this manual, section Programming.
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