



PRE-INSTALLATION MANUAL FOR i-SERIES MACHINES

February 2015

The information in this document is subject to change without notice and does not represent a commitment on the part of Hurco Companies, Inc. (Hurco). The software described in this document is furnished under the License Agreement to customers. It is against the law to copy the software on any medium except as specifically allowed in the license agreement. The purchaser may make copies of the software for backup purposes.

Hurco Manufacturing Company reserves the right to incorporate any modification or improvements in machines and machine specifications which it considers necessary, and does not assume any obligation to make any said changes in machines or equipment previously sold.

Hurco products and services are subject to Hurco's then current prices, terms, and conditions, which are subject to change without notice.

© 2015 Hurco Companies, Inc. All rights reserved.

Patents: U.S. Patents B14,477,754; 5,453,933; Canadian Patent 1,102,434; Japanese Patents 1,649,006 and 1,375,124; other Patents pending.

Hurco, Max, Ultimax, and WinMax are Registered Trademarks of Hurco Companies, Inc.

AutoCAD, Autodesk, and DXF are registered trademarks of Autodesk, Inc.

MS-DOS, Microsoft, and Windows are registered trademarks of Microsoft Corporation.

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Hurco has listed here all trademarks of which it is aware. For more information about Hurco products and services, contact:

Hurco Companies, Inc.

One Technology Way
P.O. Box 68180
Indianapolis, IN 46268-0180

For Hurco subsidiary contact information, go to Hurco's Web site:
www.hurco.com

INSTALLATION CHECKLIST

- Prepare the site. 1 - 2
- Ensure the foundation and floor are capable of supporting the machine's weight. 1 - 3
- Ensure there is a clear route from the loading dock to the machine location. . 1 - 4
- Ensure there is adequate space for machine door clearances. 1 - 4
- Ensure there is appropriate power availability and the voltage requirements are met. 1 - 5
- Ensure adequate service fusing is available. 1 - 6
- Ensure transformer requirements are met. 1 - 7
- Ensure proper grounding of machine. 1 - 7
- Ensure compressed air is available. 1 - 8
- Ensure operating temperature requirements are met. 1 - 8
- Inspect the machine for damage. 2 - 2
- Ensure an appropriate forklift or crane is available to lift the machine. 2 - 3
- Review the pre-installation requirements. 3 - 1
- Schedule an appointment for a Hurco-certified Service Engineer to prepare the machine for start-up after power is connected by a Certified Electrician. 3 - 2
- Attend a Hurco programming training class for machine operators. 3 - 3

DOCUMENTATION CONVENTIONS

This documentation uses several conventions to explain the safety features and emphasize key concepts. These conventions are described in this section.

Icons

This manual may contain the following icons:

Caution/Warning



The operator may be injured and the machine severely damaged if the described procedure is not followed.

Important



Ensures proper operation of the machine and control.

Troubleshooting



Steps that can be taken to solve potential problems.

Hints and Tricks



Useful suggestions that show creative uses of the WinMax features.

Where can we go from here?



Lists several possible options the operator can take.

TABLE OF CONTENTS

Pre-Installation Manual for i-Series Machines

Installation Checklist	iii
Documentation Conventions	v
Icons	v
Site Preparation	1 - 1
Machine Overview	1 - 1
Bearbeitungszentrum mit WinMax-SteuerungPreparing the Site	1 - 2
Foundation Supporting the Machine	1 - 3
Foundation Guidelines	1 - 3
Anchoring Machine to Foundation	1 - 3
Machine Dimensions	1 - 4
Electrical Service Requirements	1 - 4
Calculating Service Fusing	1 - 6
Recommended Isolation Transformer Configuration	1 - 7
Grounding Equipment	1 - 7
Compressed Air Requirements	1 - 8
Recommended Operating Temperature	1 - 8
Tool Retention Knobs	1 - 9
Machine Arrival	2 - 1
Inspecting for Damage	2 - 2
Moving the Machine into Final Position	2 - 3
Machine Lifting Requirements	2 - 3
Removing Auxiliary Equipment	2 - 3
Lowering the Machine onto its Foundation	2 - 6
Start-up Preparation	3 - 1
Pre-Installation Requirements	3 - 1
Other Materials	3 - 2
Service Visit	3 - 2
Programming Training	3 - 3
Release Notes	I
Index	I

SITE PREPARATION

This manual provides instructions for tasks that should be completed prior to the machine installation.

Machine Overview

The pictures below identify some of the easily recognized components of machines. The location of some components may differ on other models.



1. Max Console
2. Turret
3. Conveyor option
4. Coolant Drip Tray
5. Enclosure Door
6. Spindle
7. Tailstock/Chuck Gauge options
8. Tailstock/Chuck Footswitch options

Figure 1–1. Turning Center with Max Console



1. Dual-screen Console
2. Machining Table
3. Chip Conveyor
4. Enclosure Doors
5. Spindle
6. Automatic Tool Changer
7. Coolant Gun
8. Air Gun

Figure 1–2. Machining Center with dual-screen console

Preparing the Site

□ Prepare the site.

To avoid problems when the equipment arrives for installation, Hurco recommends that the following items be reviewed to ensure that the machine will be ready for the Hurco Service Engineer to install the machine.

Please refer to the model-specific Specification Sheets for weight and dimension specifications for each model.

Review the following:

- Capacity of the floor to support machine weight.
- Capacity of forklift or crane to lift the machine and accessory skids.
- Overhead and door clearances to allow the machine to enter building and machine location.
- Plant obstructions on the way to machine location.
- Code requirements for utility services.
- Proximity of compressed air and proper electrical service.
- Space to allow efficient operation, considering full axes travel and future servicing access requirements.
- Use of internal personnel for management of installation.

Foundation Supporting the Machine

- Ensure the foundation and floor are capable of supporting the machine's weight.

The foundation must be able to support the weight of the machine and should be constructed of continuous concrete (reinforced is best). The thickness and consistency of the concrete must be compatible with industry standards for supporting machine weight. Actual requirements will depend upon the physical properties of underlying soil. A local civil engineer must be consulted if soil conditions are questionable.

All Hurco machining and turning centers sit on leveling pads that allow the machine to be leveled.

- ⇒ Please refer to the model-specific specifications document for the machine foundation drawing to provide to the Civil Engineer for location and placement of the leveling pads for the machine, and for machine weight.

Foundation Guidelines

The following guidelines are listed on the Foundation/Floor Plan Assembly drawing for each machine:

1. Flatness allowance of the floor level should be within ± 10 mm (0.39 in).
2. Take precautions so that there are no cracks in the concrete.
3. Leveling bolts are supplied in the shipping box with the machine.
4. Based on the soil conditions, the stiffness of the foundation shall be determined, so that the machine base does not deflect more than 0.013 mm (0.0005) inches to maintain the machine accuracy and performance.
5. The drawing located in the Model-specific Specifications document shows the general arrangement required for the machine foundation. Local masonry contractor and/or civil engineers must be consulted for additional recommendations (e.g. depth, reinforcing steel based on the load bearing characteristics of the soil) to achieve specified performance of the machine.
6. Foundation contractor must paint foundation with a liquid proof paint prior to the installation of the machine to prevent the foundation from absorbing moisture.

Anchoring Machine to Foundation

For improved performance, accuracy, and reliability, Hurco recommends that machines be anchored to the foundation. If a machine is to be anchored, failure to follow the recommended foundation guidelines may void guarantees of quoted machine accuracy.

If a machine is to be anchored, the following requirements must be met:

1. Core drilled hole must be prepared to ensure proper adhesion of grout to the

foundation concrete.

2. The grout and anchor bolt manufacturers' recommendations must be followed to ensure full strength of the foundation.
3. After proper cure time, the anchor bolt must be capable of allowing a minimum torque transmission of 271 Nm (200 ft-lb).

Machine Dimensions

- ☐ Ensure there is a clear route from the loading dock to the machine location.

When moving a machine, be sure to allow adequate space for maneuvering. If door and ceiling clearances appear to be close to approximate machine dimensions, measure the machine first before attempting to move it.

- ☐ Ensure there is adequate space for machine door clearances.

Allow additional space around the machine for servicing and safe operation. Leave room for removing the coolant tank and the chip conveyor (if equipped).

The Model-specific Specifications document provides these machine dimensions:

- **Shipping Dimensions**—height, width, length, and weight configuration of the machine and auxiliary equipment as mounted to the skid. Shipping dimensions are measured with the machine on its shipping pallet.
- **Operating Dimensions**—width and length measurements that must be considered for maintenance and service of the machine, such as opening all enclosure and electrical power cabinet doors and location of auxiliary equipment.

Electrical Service Requirements

The customer is responsible for providing incoming electrical power to the Hurco machining center or turning center.

⇒ Run an electrical power line of adequate length and gauge to the machine's location to reach the connections in the power cabinet. Final connections must be supervised by a Hurco-certified Service Engineer.

□ Ensure there is appropriate power availability and the voltage requirements are met.

□ The machine's full load KVA power rating can be found on the serial number identification tag that is affixed to the electrical power cabinet.

⇒ See the Model-specific Specifications document for Full Load KVA and Full Load Amp ratings to ensure proper wire gauge.

A certified electrician should ensure the following electrical service requirements:

- On-site wiring must comply with all applicable electrical codes.
- Dedicated, grounded 3-phase AC power is required to prevent high/low voltages, spikes, surges, and noise.
- The AC power source shall be balanced and must match the voltage specifications on the machine electrical cabinet.
- Wiring to the machine must be capable of supplying continuous specified amperage.
- Failure to provide the required power parameters may affect safety, machine performance, and the warranty.
- A Hurco-certified Service Engineer must supervise final electrical connections to the machining center.



Always disconnect machine power before working with electrical connections.

Calculating Service Fusing

- Ensure adequate service fusing is available.

First, determine your incoming AC Voltage, 3 Phase service. Use the Service KVA Requirements to calculate the service fusing for your machine.

For 3-phase power, the equation is $P_{3\Phi} = \frac{I}{\sqrt{3} \times E}$.

For example, to calculate the fuse current where incoming service KVA ($P_{3\Phi}$) is 50 KVA and Input Voltage (E) is 400 VAC:

$$I = \frac{P_{3\Phi}}{E \times \sqrt{3}} = \frac{50,000VA}{400V \times 1.732}$$

$$I = \frac{50,000VA}{693V} = 73A$$



See the Model-specific Specifications document for Incoming Voltage and Full Load KVA.

Recommended Isolation Transformer Configuration

- Ensure transformer requirements are met.

If a transformer is required and the machine was not equipped with one, the customer is responsible for providing a transformer. The transformer must meet Hurco machine-operating voltage requirements. Hurco recommends the Wye configuration (4) on the transformer secondary that feeds power to the machine. It is the customer's responsibility to have a qualified electrician connect the transformer to the power source.

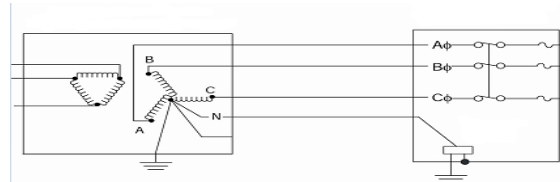


Figure 1–3. Wye Transformer Configuration

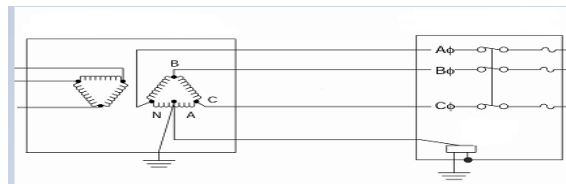


Figure 1–4. Delta Transformer Configuration

Grounding Equipment

- Ensure proper grounding of machine.

The electrical and electronic control systems of the machining center are interconnected internally and terminate at a single point ground (SPG) terminal. The SPG provides only one conducting path between the machine and external ground, preventing an unwanted ground loop (ground differential voltage). The SPG is located inside the machine power cabinet.

The SPG must be properly connected to the ground circuit of the AC power source.

The grounding conductor must be sized to conform to all applicable electrical codes. However, Hurco recommends that the size of the neutral conductor (when applicable) be at least the size of the phase (current carrying) conductors.

Compressed Air Requirements

- ☐ Ensure compressed air is available.

A continuous supply of clean and dry compressed air is required for proper machine operation. Compressed air will connect to the machine's filter, regulator, lubricator (FRL) unit. Use these specifications:

⇒ See the Model-specific Specifications document for Air Supply specifications.

- Air humidity dew point: 2° C (35° F).
- Use a minimum 13 mm (0.5 in) diameter (trade size) pipe supply line to the machine.
- Install a drip leg in the line before the connection to the FRL unit. The drip leg will help remove the moisture in the air supply and improve operation of the FRL unit.
- Do not use quick-coupler type fittings at the connection to the FRL unit or in the supply line to the machine because these fittings restrict the air supply.

Recommended Operating Temperature

- ☐ Ensure operating temperature requirements are met.

Hurco machines may be operated in a facility with ambient temperatures ranging from 0° C to 35° C (32° F to 95° F) and in non-condensing relative humidity up to 95%. The electrical cabinet has a heat exchanger to regulate the temperature inside the cabinet to ensure that the electronics operate within their temperature limits. Some high-duty cycle applications may require that the heat exchanger be replaced with an optional air conditioner.



For ambient shop temperatures higher than 35°C (95°F), an optional air conditioner is recommended in place of the heat exchanger to ensure the electronics operate within their rated limits.

Set up the machine away from external heat sources, such as direct sunlight and heating vents.

Tool Retention Knobs

Tool retention knobs are required for all Hurco machining centers. The knobs are attached to the top of tool holders and are used by the spindle's clamp mechanism to hold the tool in the spindle. Please refer to the Model-specific Specifications document for more information.

MACHINE ARRIVAL

Upon machine arrival, please complete the following instructions to place the machine at the installation site (see the appropriate section for detailed information):



Follow all local regulations for safe handling of machinery.

1. Inspect the machine upon arrival.
2. Lift machine off the truck or transporter.
3. Move machine near permanent location.
4. Remove auxiliary equipment from pallet.
5. Lift the machine from the pallet.
6. Place the machine on the pads.
7. Rough level the machine.



- Do not remove any bracing on the machine.
- Do not remove equipment from inside the machine.
- Do not remove auxiliary equipment from a second pallet, if equipped.
- Do not remove or install the console.

Inspecting for Damage

- Inspect the machine for damage.

Hurco recommends that the machine equipment be inspected for shipping damage before unloading and placing machine onto foundation.

⇒ Any damage that occurs during lifting machine off of shipping pallet or placing into position is the responsibility of the customer or the customer's rigging agent.

- Remove all wrapping around machine to inspect the shock sensor.
- Before unloading the machine from the shipping carrier, check to see if the shock meter sensor is tripped. This sensor is located on the casting in the rear of the machine. The shock meter sensor is a spring-loaded device that will dislodge the springs if the machine experiences a shock that exceeds 2g.



Figure 2–1. Shock Meter Sensor—intact (photo on left) and dislodged (photo on right)

⇒ If the sensor springs are dislodged, inspect the machine carefully for damage, including all castings.

- Examine the machine for structural damage.
- Note any shipping damage to the machine on the shipper's bill of lading. It is the customer's responsibility to file a damage claim.
- Photograph any equipment damage for your records.

⇒ Hurco-certified Service personnel can help determine the cost of repairing any damages that occurred during shipment, or during or after placement of machine onto its foundation.

Moving the Machine into Final Position

Hurco recommends that the customer review this section to determine if there is proper capacity and ability to lift and place the machine into the location. If not, then a rigging agency should be contacted.

- ⇒ Ensure door clearances are sufficient for the machine to be moved through. Refer to the Model-specific Specifications document for machine dimensions.
- ⇒ Ensure the lifting brackets and crane/forklift capacity are sufficient to hold the machine's weight. Refer to the Model-specific Specifications document for machine weight.

Machine on shipping pallet with auxiliary equipment may be moved near the final position before it is removed from shipping pallet.

Machine Lifting Requirements

- Ensure an appropriate forklift or crane is available to lift the machine.

Be sure the crane or forklift is sized properly to lift the machine's shipping weight. The machine's shipping weight is defined as the machine on the shipping pallet with the auxiliary equipment still on the pallet.

Move the machine on its shipping pallet to a location next to the final installation site. Set the machine and pallet down, allowing enough space around the machine to later lift the machine off of the shipping pallet. Machine should be removed from the shipping pallet by using a crane or forklift. Be sure the crane or forklift is sized properly to lift the machine off of the shipping pallet.

Removing Auxiliary Equipment

It is recommended to remove auxiliary equipment from the shipping pallet after moving machine on shipping pallet near permanent installation site.

1. Unpack the equipment:
 - a. Remove the outer covering and all boxes attached to the pallet.
 - b. Remove all packaged items (conveyors, tanks, chillers) from the shipping pallet.
2. Verify all equipment has arrived and is unloaded.
3. Inspect machine for damage.
4. Remove the nuts and washers that attach the machine to the shipping pallet.



- Do not remove any bracing on the machine.
- Do not remove equipment from inside the machine.
- Do not remove auxiliary equipment from a second pallet, if equipped.
- Do not remove or install the console.

Refer to the appropriate section below for details about lifting the machine.

Lifting the Machine with Forklift

When using a forklift to lift the machine while still on shipping pallet, be sure to place tines beneath the shipping pallet using the pallet lifting tubes.



Because the power cabinet is located at the rear of the machine, longer fork tines are required when lifting at the rear of the machine.

Some models may require solid steel lifting bars when lifting a machine from the rear of the machine. Lifting bars must be long enough to span the machine frame, and be capable of supporting the machine without bending.

To lift the machine from the pallet:

Um die Maschine von der Palette zu heben:

1. Insert the forklift tines between the cast supports, so that a cast support is between the right and left forklift tines.
2. Keep adequate clearance between the machine and the front of the forklift by placing wedge blocks on top of the forks.



The forklift must be rated to handle the machine's weight. For the weight of your machine, refer to the Machine Dimensions section of the Model-specific Specifications document.

3. Carefully lift the machine off of the pallet.

Lifting the Machine with Crane

A crane lifting bracket is required for the machines listed in the following table and can be provided by Hurco.

Machine	Crane Lifting Bracket Part Number
Turning Centers*	804-0601-119
VMX64 and VMX84 i-Series	003-6000-011
VTXZi	003-4111-064

* For Turning Centers, lifting brackets are attached to the machine frame.



To lift the machine, either with pallet or to lift machine from pallet:

1. Use proper lifting straps attached to machine-mounted lifting brackets and the proper bracket of the crane lifting bracket. The crane lifting bracket is marked to indicate which bracket should be used for each model.

- Carefully lift the machine, ensuring balanced loading on the crane lifting bracket.
 - ⇒ A spreader bar and cables rated to hold the machine's weight are required when lifting a VTXUi machine with a crane. Required eyebolts are supplied with the machine.
 - ⇒ Yokes and cables rated to hold the machine's weight are required when lifting a VTXZi machine with a crane. Required eyebolts are supplied with the machine.

Lowering the Machine onto its Foundation

After lifting the machine from its shipping pallet, position the machine over the spot where the machine is to be installed.

- Lower the machine to within 150 to 250 mm (6 to 10 inches) of the floor. Do not set the machine down.
- Position the leveling pads directly beneath the leveling bolts.
 -  All leveling bolts—including the center ones—must be used in rough leveling to evenly support the machine.
- Adjust the leveling bolts to half travel.
- Lower the machine onto the leveling pads. Each leveling bolt should be touching a leveling pad.
- Adjust the leveling bolts to rough level the machine.
 - Equal weight on all leveling pads.
 - Each bolt is touching a pad.
 - Bolts are inserted approximately half way to allow equipment to fit beneath the machine.
 - Adjust the leveling bolts about halfway, so the coolant tanks can clear the bottom of the enclosure, on applicable machines.
 - Adjust the leveling bolts until they press into the indentation underlying the footpad, on applicable machines.
 - Adjust all screws evenly to the same torque so that the machine is in balance.
- Once the machine is resting on all leveling pads, remove the forklift (or crane).
 - 
 - Do not remove any bracing on the machine.
 - Do not remove equipment from inside the machine.
 - Do not remove auxiliary equipment from a second pallet, if equipped.
 - Do not remove or install the console.

START-UP PREPARATION

This chapter contains information about preparing for machine start-up.

Pre-Installation Requirements

☐ Review the pre-installation requirements.

Before your full service distributor or Hurco customer service department arrives to install the machine, complete the following requirements:

- All machine equipment is located at the final installation site.
- Machine is positioned for installation, on a suitable foundation that will bear its weight.
- Machine is rough-leveled.
- Utilities (air and electricity) have been made available, but are not connected or turned on.
- Flood coolant tank, tubing, chiller, and coolant pump motor are placed near the machine base.
- Acquire tool retention knobs (Machining Centers). Please refer to the Model-specific Specifications document for details.
- **VERY IMPORTANT!** Lubrication and fluids are available:

Turning Centers	
Component	Available Lubrication
Hydraulic Tank	fluid, equivalent to ISO. VG 32
Chuck and Tailstock	grease for plug points
Turret	oil, equivalent to ISO VG-100-150
Way Lube Systems	oil, equivalent to Waytac Oil #68

Machining Centers	
Component	Available Lubrication
ATC Components and Drives	grease, equivalent to Amolith Grease #2 EP
Air Line Lubes and Spindle Oil Coolers	oil, equivalent to American Ind. Oil #32
Way Lube Systems and Spindle Taper	oil, equivalent to Waytac Oil #68
Air/Oil Unit for Tool Release Cylinder	oil, equivalent to Teresso 32

A Hurco-certified Service Engineer will visit your site and prepare the machine for start-up.



It is the customer's responsibility to provide tooling, coolant, and appropriate lubrication and hydraulic fluid.

Other Materials

Please have these materials on hand when the Hurco-certified Service Engineer arrives so that the machine can be fully tested for commissioning.

For Machining Centers:

- Tool holders
- Retention knobs
- Material for test cut
- Coolant mixture

For Turning Centers:

- Tooling
- Boring Bars
- Inserts
- Additional Chuck Jaws
- Collets for the optional collet chuck, if applicable
- Spindle Liners for doing bar work
- Straight Shank Collet Chucks for small drills
- Tension/Compression Tap Holder
- Additional boring sleeves if needed
- Material for test cut
- Coolant mixture

Service Visit

☐ Schedule an appointment for a Hurco-certified Service Engineer to prepare the machine for start-up after power is connected by a Certified Electrician.

A Certified Electrician needs to provide power to the machine prior to the service engineer's arrival. The Hurco-certified Service Engineer performs these tasks:

1. Checks electrical service to the Main Disconnect switch on the machine.
2. Installs the control console.
3. Measures voltages in the electrical cabinet and the control enclosure.
4. Installs the flood coolant tank and coolant pump motor.
5. Installs covers and enclosures.
6. Completes the machine level and makes required adjustments.
7. .Checks fans and pumps for proper operation
8. Checks all axes for calibration and correct limit switch operation.
9. Installs and tests all options.

Programming Training

☐ Attend a Hurco programming training class for machine operators.

Hurco and full-service distributors offer hands-on training classes to demonstrate the powerful programming capabilities of its controls. Customers will gain knowledge of the console and machine by attending training classes.

For additional information or to register for a training class, contact your local Hurco office or distributor, or go to the Hurco website at **www.hurco.com**.

RELEASE NOTES

Pre-installation Manual for i-Series Machines

v387 February 2015

Revised by: H. Arle

Approved by: D.Skrzypczak

Update to add Machining Centers.

Manual title update to "Pre-Installation Manual for i-Series Machines."

v385 January 2015

Revised by: K. Gross

Approved by: D.Skrzypczak

Initial release for Turning Centers only.

INDEX

A

air humidity 1 - 8

C

classes, training 3 - 3

control, training 3 - 3

coolant

 flood tank 2 - 3, 3 - 1

 pump motor 2 - 3, 3 - 1

 removing tank 1 - 4

D

damage, claim 2 - 2

dimensions, machine 1 - 4

E

electrical

 codes 1 - 5

 hookup 1 - 4

 requirements 1 - 4

 transformer 1 - 7

equipment

 electrical grounding 1 - 7

 grounding 1 - 7, 1 - 8

 inspection 2 - 2

 installation 3 - 1

 unpacking machine 2 - 3

F

foundation

 construction requirements 1 - 3

 lowering the machine onto 2 - 6

G

ground (SPG) terminal, single point 1 - 7

grounding equipment 1 - 7, 1 - 8

H

humidity

 air 1 - 8

 electrical cabinet 1 - 8

Hurco training 3 - 3

I

icons - v

input voltage 1 - 7

inspecting for damage 2 - 2

installation

 machine 2 - 6, 3 - 1

 preparing site 1 - 2

isolation transformer

 recommended configuration 1 - 7

L

leveling bolts 2 - 6

lifting

 steel lifting bars 2 - 4

lowering the machine onto its foundation
2 - 6

M

machine

 coolant system 1 - 9

 equipment, unpacking 2 - 3

 final positioning 2 - 6

 foundation 1 - 3

 grounding 1 - 7

 inspection 2 - 2

 installation (see installation) 1 - 2

 leveling bolts 2 - 6

 recommended humidity and

 temperature, operating 1 - 8

 removing from shipping pallet 2 - 6

 requirements before service visit 3 - 1

 start-up 3 - 1

 transformer 1 - 5, 1 - 7

 unpacking equipment 2 - 3

meter sensor, shock 2 - 2

moving the machine into final position 2 - 3

O

operating

 machine dimensions 1 - 4

 temperature 1 - 8

P

point ground (SPG) terminal, single 1 - 7

preparing the installation site 1 - 2

R

removing coolant tank *1 - 4*
requirements
 foundation *1 - 3*
 installation site *1 - 2*

S

Schäden
 an neuen Maschinen
 Inspektion *2 - 2*
sensor, shock meter *2 - 2*
shipping
 (machine dimensions) *1 - 4*
 unpacking equipment *2 - 3*
shipping pallet, removing machine *2 - 6*
shock meter sensor *2 - 2*
single point ground (SPG) terminal *1 - 7*
site
 foundation *1 - 3*
 preparing for machine *1 - 2*
 preparing the installation *1 - 2*
SPG terminal, single point ground *1 - 7*
start-up
 requirements *3 - 1*

T

temperature, operating *1 - 8*
terminal, single point ground (SPG) *1 - 7*
tool retention knobs *1 - 9*
training classes *3 - 3*

U

unloading machine from pallet *2 - 6*
unpacking machine equipment *2 - 3*

V

voltage input *1 - 7*

W

weight, machine and supporting foundation
 1 - 3
WinMax training *3 - 3*