

WAGNER INDUSTRIES, INC.

Roll To Roll Manufacturing Line
Model #: R2R-1

Manufactured for Purdue University

Manufactured by:
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WAGNER MODEL R2R-1
S/N H3859
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WAGNER MODEL R2R-1
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U/V UNIT
SEC 11

FOR U/V TREATMENT, A MERCURY LAMP LIGHT SOURCE IS LOCATED WITHIN AN AMBER ENCLOSURE. LOCATED EITHER JUST BEFORE OR JUST AFTER THE MAGNET. LOCATING PINS AND PLATES ARE MOUNTED ON THE MACHINE FRONT AND REAR MAIN TOP RAILS. THE U/V ASSEMBLY HAS MATCHED DRILLED HOLES THAT LOCK THE POSITION OF THE U/V HEAD. AN OVERHEAD SWING HOIST ARM ALLOWS FOR AIDING THE MOVE FROM ONE POSITION TO ANOTHER SINCE THE UNIT REQUIRES 2 PEOPLE MOVE THE UNIT. ALL AIR, WATER AND ELECTRIC LINES ARE PLUG-IN AND ARE SELF SEALING.

THE LAMP HOUSING HAS INTERNAL WATER COOLING AND A SOLENOID VALVE AT THE REAR OF THE MACHINE TURNS ON COOLING WATER WHEN THE U/V SWITCH IS ON. AIR IS ALSO CONTROLLED FOR COOLING OF THE LAMP AND HOUSING. A 3 VALVE MANIFOLD AT THE REAR OF THE MACHINE CONTROLS THE AIR FLOW COOLING, AND THE SHUTTER THAT OPENS WHEN THE LAMP HAS REACHED WARM-UP TEMPERATURES. THE SHUTTER CLOSES WHEN THE LAMP IS TURNED OFF.

INSIDE THE MAIN OPERATOR PANEL IS A DEDICATED PLC THAT CONTROLS ALL U/V FUNCTIONS. AN HMI SCREEN ON THE MAIN OPERATORS PANEL DISPLAYS THE STATUS OF THE SYSTEM AND THE LAMP INTENSITY IS CONTROLLED USING A 1 TURN POTENTIOMETER ON THE MAIN PANEL NEXT TO THE HMI SCREEN.

CAUTION SHOULD BE USED WHEN MOVING THE LAMP ASSEMBLY SINCE THE ACRYLIC HOUSING CAN BE BROKEN IF BUMPED OR DROPPED. THE AMBER COLOR IS USED AS A U/V RADIATION SHIELD, HOWEVER, EYE PROTECTION SHOULD ALSO BE WORN AS A SAFEGUARD AGAINST EYE DAMAGE.

A FULL SYSTEM DESCRIPTION AS WELL AS LAMP REPLACEMENT IS DESCRIBED IN THE BALDWIN OEM MANUALS AT THE END OF THIS MANUAL.

WAGNER MODEL R2R-1

S/N H3859

U/V UNIT

SEC 11

LAMP START-UP PROCEDURE

1. TURN U/V SWITCH TO "ON" POSITION (GREEN INDICATOR ON).
2. OPERATOR SCREEN LIGHTS UP AND PROMPTS OPERATOR AS TO SYSTEM STATUS. FIRST SCREEN WILL SHOW "SELF TEST" AND LAMP WILL BEGIN TO WARM UP.
3. LAMP "READY" SIGNAL IS SENT TO U/V HEAD AND POWER SUPPLY.
4. TURN LAMP ON TOGGLE SWITCH TO "ON" POSITION.
5. TURN SHUTTER TOGGLE SWITCH TO "OPEN" POSITION.
6. SET LAMP INTENSITY POTENTIOMETER TO DESIRED BRIGHTNESS.
7. LAMP INTENSITY IS SETTABLE BETWEEN 50 TO 200 WATTS PER CM.
8. FOR LAMP OFF - TURN LAMP ON TOGGLE SWITCH TO "OFF" POSITION. COOLING AIR WILL CONTINUE UNTIL SYSTEM SENSES COOLDOWN TEMP.
9. TURN U/V POWER SELECTOR SWITCH TO "OFF" POSITION. GREEN INDICATOR WILL EXTINGUI SH.

U/V ASSEMBLY

SEC 11

AIR, WATER AND
ELECTRIC CONNECTIONS

ACRYLIC
HOUSING

LIFT HANDLES

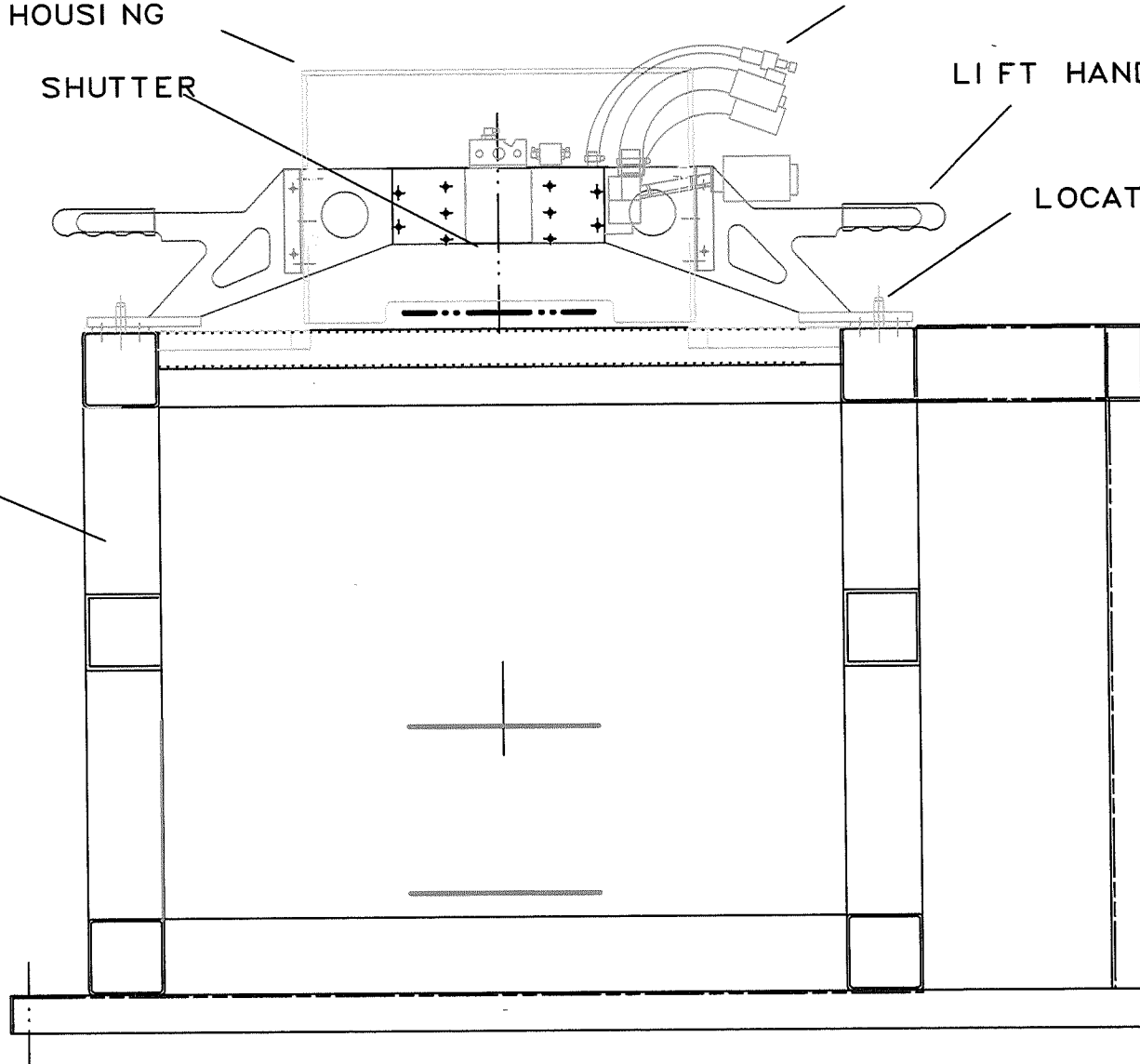
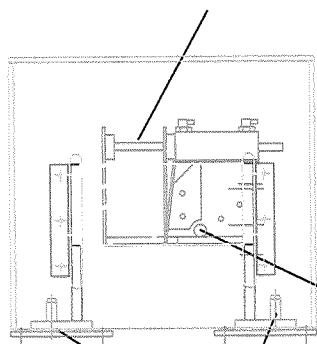
SHUTTER

LOCATING PINS

LAMP

PINS

MACHINE
FRAME



Service Functions

1. Service routines are included in the software to make troubleshooting of some components easier.
2. These routines are password protected and involve the use of the P Buttons on the display screen on the front of the unit.
3. These routines will only operate when the lamp is off and no faults are indicated (system off screen is displayed).

P1. Shutter test. Hold the P1 key down whilst operating the full power selector switch

P2. Air valve test. Hold the P2 key to activate the air cooling valve

P3. Cooler test. Hold the P3 key to start the water cooler

P4. Sensor test. Hold the P4 key to display the pressure sensor readings

Accessing Service Functions

1. On the display screen press the OK button to enter setup screen
2. Use the arrow keys to select the password setting and then press OK
3. Press OK once more and use the cursors keys to enter the service password - 43214X
4. Press the Del and Alt Keys Together. Select the System menu and Press OK
5. Use the arrow keys to select the P Buttons setting and press OK enable - A tick should appear next to the P Buttons
6. Press Esc twice which will bring back the main system off screen
7. Use the P Buttons (arrow keys) to select the desired function as detailed above
8. When complete disable the P Buttons again by unticking the P Button setting (steps 4 to 6)
9. Recycle the power to re-engage the password

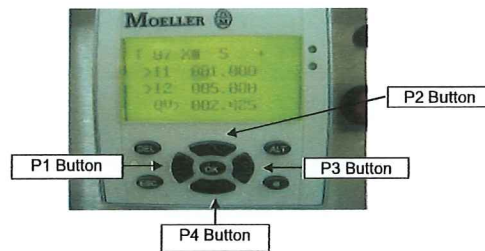


Image 1 - PSU Front

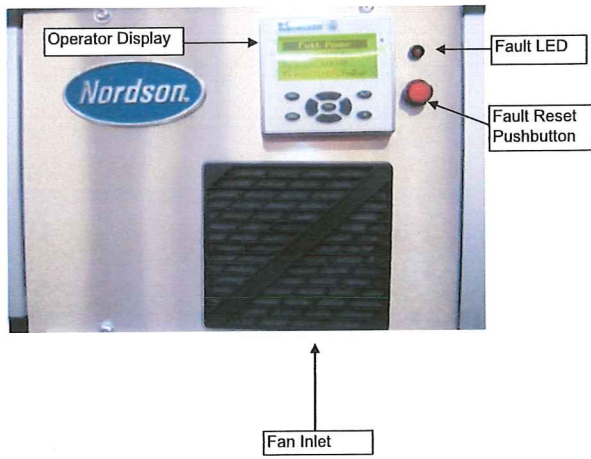


Image 2 - PSU Rear

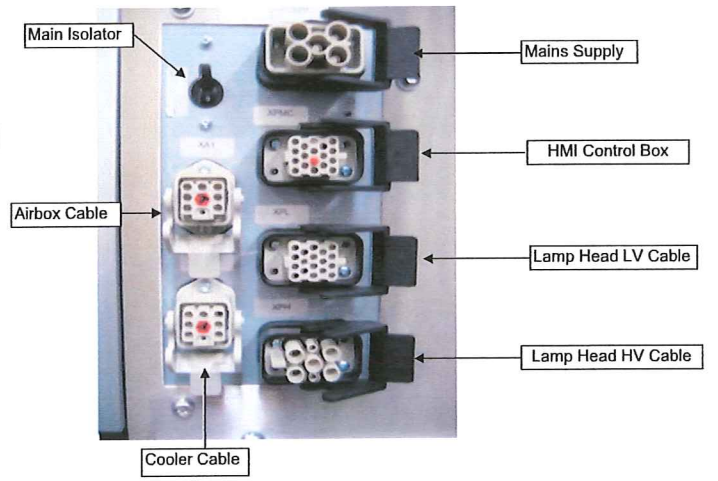


Image 3 - DropCure Lamp Head

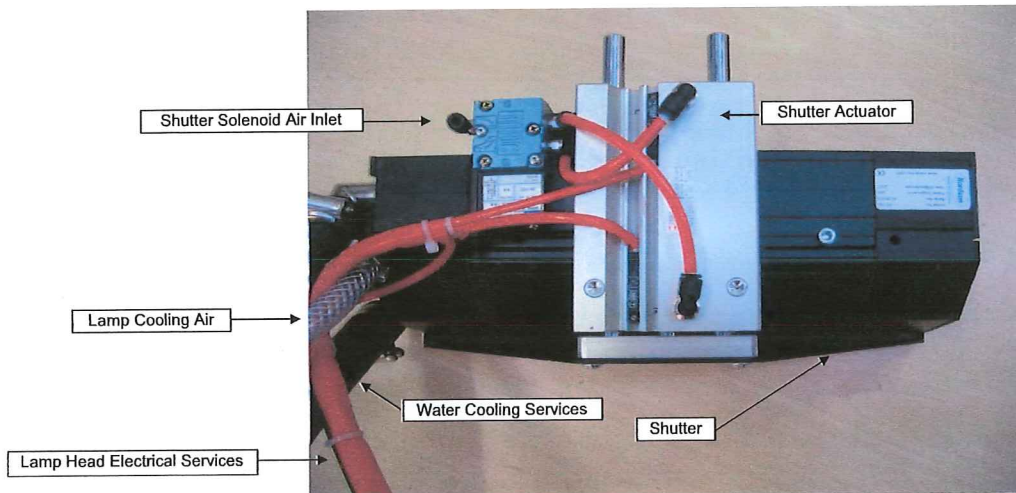
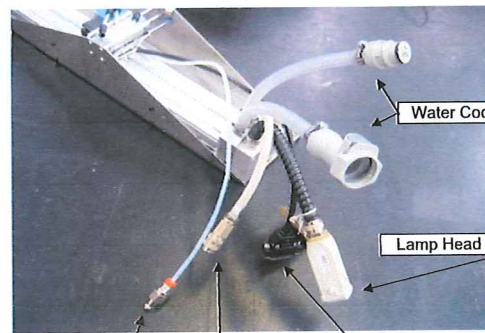
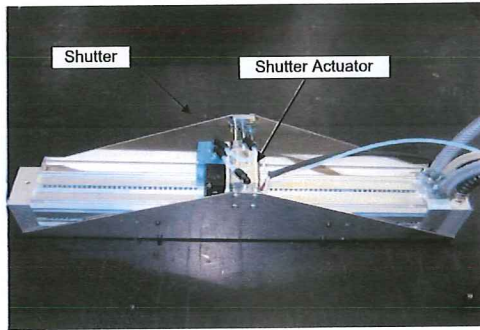


Image 4 - TinyCure Lamp Head



Shutter Solenoid Air Inlet

Lamp Cooling Air

Lamp Head Low Voltage

Image 5 - HMI Control Box

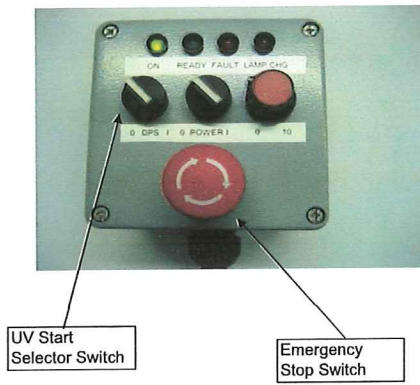
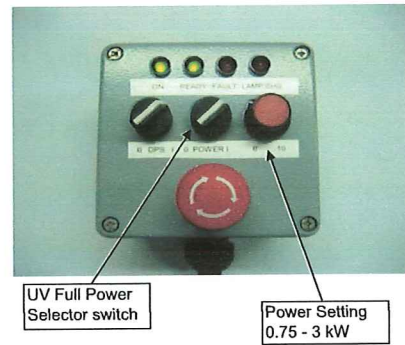


Image 6 - HMI Control Box



Pre-Start Procedure

1. Ensure all necessary cables are connected. i.e.

Mains Inlet

a) 208V- 255V / 18A Single Phase Supply - see Image 2

HMI Control Box

a) Ensure control cable is connected to the PSU - see Image 2

b) Ensure "UV Start" and "Full power selector switch" is in the off position - See image 5

Lamphead

a) Connect high voltage cable - see Image 2, 3 or 4

b) Connect air hoses and water hoses - see Image 3 or 4

c) Connect airbox cable - see Image 2, 3 or 4

d) Connect cooler cable - see Image 2, 3 or 4

e) Ensure bulb is fitted inside lamphead and the connections are fully tightened

Lamp Start Procedure

1. Switch mains isolator On -The PLC display, LED on front panel and HMI box are lit
2. Select UV start selector switch to On
3. After an initial self test the lamp will begin to "Burn-in"
4. Once the lamp is ready - "Lamp ready" signal is given to the machine - green lamp on is lit on the HMI Box
5. Switch on the "Full power selector switch" and the lamp shutter will open.
6. As the power setting is increased (0-10v) the UV lamp will increase in power, e.g.

Machine speed - 0-----10v

Lamp Power - min-----max w/cm

7. Switch off the "Full power selector switch" - UV lamp shutter will close and lamp will be at standby power (67 w/cm)

Lamp Hour Reset

1. UV lamp hour counter can be monitored from the PLC display panel standby screen and full power screen
2. To reset lamp hour counter, press and hold the Reset pushbutton for 4 seconds

Operating Messages

System Off
Nordson UV
DropCure 150

1. This message indicates that there are no faults and the UV lamp is ready to start

Self Test002.350
Press +0168mBar

1. When UV Start selector switch is ON The system first performs a self test of critical systems
2. During the self test the sensor readings are displayed. The fan operates during the self test
3. Once self test is passed the signal is automatically given for lamp ignition

Lamp Warming
Press +0168mBar

1. This message is displayed during lamp "burn-in". The cooling is off at this time
2. The shutter is closed at this time

Lamp Standby
Mcm +0067
Hrs +0000
Press +0084mBar

1. Message displayed when burn-in is completed and the lamp is ready for operation
2. The shutter is closed at this time

Full Power
Wcm +0200
Hrs +0000
Press +0977mBar

1. Message displayed when lamp is switched to Full Power operation
2. The shutter is open at this time
3. Lamp power is settable between 50 - 200 wcm

Lamp Off
Cooling On
Sec 049.410

- Message is displayed when
- a) Lamp is switched off due to an alarm condition
 - b) Lamp is manually switched off by setting the UV Start selector switch to Off

Alarm Messages

**Lamp Off
PSU or
System Fault**

- Check: 1. Check wiring and connections
2. If fault persists replace PSU
Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

**Lamp Off
Lamp Failure**

- Check: 1. Check lamp wiring and connections
2. If fault persists replace lamp
2. If fault still persists replace psu
Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

**Lamp Off
Lamp Fault
No Lamp Ready**

- Check: 1. Lamp is correctly installed in lamp head
2. Check all cables are correctly installed
3. Replace lamp with another to see if problem still persists
Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

**Lamp Off
Water Cooler
Fault**

- Check: 1. Check wiring and connections
2. Recycle power and see if problem still occurs
3. Check switches inside cooler and all electrical wiring / connections to it
Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

Lamp Off
Shutter Closed
Fault

- Check: 1. Check wiring and connections
2. Recycle power and see if problem still occurs
3. Check proximity switches on lamphead and all electrical wiring / connections to it

Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

Lamp Off
Shutter Open
Fault

- Check: 1. Check wiring and connections
2. Recycle power and see if problem still occurs
3. Check proximity switches on lamphead and all electrical wiring / connections to it

Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

Lamp Off
Pressure
Sensor Failure

- Check: 1. Check wiring and connections
2. Recycle power and see if problem still occurs
3. Check pressure sensor in airbox and all electrical wiring / connections to it

Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

Lamp Off
Lamp Cooling
Pressure Low

- Check: 1. Check wiring and air supply
2. Recycle power and see if problem still occurs
3. Check pressure sensor in airbox and all electrical wiring / connections to it

Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

Lamp Off

Lamp Cooling
Pressure High

- Check:
1. Check wiring and air supply
 2. Recycle power and see if problem still occurs
 3. Check pressure sensor in airbox and all electrical wiring / connections to it

Note: UV lamp is switched off. Press Reset pushbutton to clear fault (see image 1)

OPERATING MANUAL

CUSTOMER NAME:	WAGNER
JOB REF NO:	11537
SYSTEM TYPE:	DROPCURE

Service Contact Information:

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DropCure UV Lamp Head

Customer Product Manual
Part 7119747D

Issued 02/11



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Congratulations on the Purchase of Your Baldwin Product

Baldwin equipment is engineered and manufactured in accordance with strict specifications, using high quality components and state-of-the-art technologies that assure reliable, long-term performance. Your product was thoroughly tested for proper operation prior to shipment.

Before unpacking and installing your new equipment, please read this manual. It is your guide to safe installation, productive operation and effective maintenance. We recommend that you keep the manual available for future reference.

Your Safety is Important to Baldwin

Carefully read the *Safety* section. Your product is designed for safe operation when used according to the published instructions. Potential hazards exist when operating instructions are not followed.

Manufacturer of Equipment

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Section 1

Safety

Introduction

Read and follow these safety instructions. Task and equipment specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Baldwin equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Work on electrical parts is only to be executed by electrically qualified personnel.

Intended Use

Use of Baldwin equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulation and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Baldwin equipment will be voided if instructions for installation, operation, and service are not followed.

Personnel Safety

All potentially hazardous situations are to be protected by safety switches.

To prevent injury follow these instructions.

Do not operate or service equipment unless you are qualified.

Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.

Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.

Relieve (bleed off) pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.

If you receive even a slight electrical shock, shut down all electrical equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.

To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power.
- Close shut-off valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- The area under and around the lamp heads must be kept clear of flammable debris.
- Use only those inks and varnishes that cannot form explosive atmospheres when heated by the lamp head (i.e. inks and varnishes whose safety data sheets specify a flammable limit must not be used).
- Inspect solvent supply lines, and couplings, of automatic cleaning devices at regular intervals for solvent leakage.
- Only solvents with a flash point of at least 55° C should be used on the machine.
- When solvents are used on the machine (e.g. for manually cleaning the cylinders and rollers), no solvent must be able to reach the lamp head (Do not use or store any solvents on or near to the lamp head).
- No cleaning should be carried out in the vicinity of the lamp heads until they have cooled down sufficiently (below 40° C).
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Shut down all equipment immediately if you notice sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Know where emergency stop buttons, shut-off valves, and fire extinguishers are located.
- Shut off electrical power and ground the charging system before adjusting, cleaning, or repairing electrical equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Baldwin representative for parts information and advice.
- If printing powder is used, powder deposits should be regularly cleaned from the delivery area (risk of the printing powder igniting) or the printing powder used should be of the non combustible type. Before any cleaning work is started on the machine, it should be switched off at the main switch and secured to prevent it from being switched on again until cleaning is completed.
- If dropped sheet detection equipment is fitted ensure that it is functioning and remove dropped sheets immediately.

If you are not certain that the above can be adhered to you may wish to consider fitting an automatic fire extinguishing system.

Equipment Safety

Introduction

All equipment is designed and manufactured to International Safety Standards to ensure that the health and safety of the operator is protected at all times. This is conditional to equipment being installed correctly by qualified personnel and operating instructions are strictly adhered to.

Everyone who is required to work with the drying equipment in any way, i.e. Installers, Operators, Service Engineers etc., must be made familiar with these safety instructions.

The equipment is designed for the accelerated drying of UV inks and coatings. No attempt should be made to dry alternative materials unless these have been cleared by the supplier for this drying technique.

This equipment is not designed for use in hazardous areas (i.e. it is not flameproof).

There are certain substances which can, if not correctly handled, represent a safety hazard.

In compliance with COSHH 1988 (Control of Substances Hazardous to Health) regulations, this document outlines a list of substances that could present a hazard to health.

Operators outside the UK should refer to their own relevant standards with respect to safe working practice and safety precautions.

High Temperatures

UV reflector systems generally run at extremely high temperatures. It is therefore necessary to check that any exposed parts which may be touched by an operator or personnel are kept below a temperature of 60° C, dependent on the material type.

If you find that any surface is above 60° C please contact the Baldwin UV service department.

High Voltage

The UV curing equipment works at high voltages. It is therefore essential that should any fault develop, the operator is made aware that he should:

Switch the equipment off immediately, make no attempt to service the equipment himself, but call a qualified electrician, trained to service this type of equipment.

NOTE: This applies to the changing of lamps, where a possible lamp fault has occurred.

Fire Risk

With lamps running at up to 800 degrees Centigrade, there is always a risk of fire should any paper or materials get jammed under or in the lamp vicinity, or in the event of build-up of fluff, dirt or powder within the lamp housing.

Should such a situation occur, the operator must:

Switch off the equipment immediately. If a fire extinguisher is to be used, make sure it is of a type which is suitable for use with electrical equipment.

A suitable fire extinguisher should be available near the unit.

This equipment is fitted with high temperature lamps. It is not designed to operate close to low flash point materials (solvents, etc.).

Noise

When the UV drying equipment is functioning, the auxiliary equipment, such as fans and coolers produce noise. The noise levels for this equipment vary between 70 dB(A) and 85 dB(A). These values have been determined through theoretical supplier values, practical experience and in house and on site testing. These values can increase when the noise from the printing equipment is included in the readings.

Safety Precaution While Servicing

Important Information

All electrical maintenance and servicing must be carried out by a qualified competent electrical engineer. It is preferable to call in Baldwin UV for this servicing facility.



WARNING: This equipment operates at high voltage and is therefore potentially dangerous. All precautions must be taken by the electrical engineer in servicing this equipment.

In the event of your electrician being unable to find fault with the equipment, then the Baldwin UV Service should be called in.

Earth Leakage

This equipment may be fitted with a high voltage leak detector circuit. This means that any fault occurring where high voltage leaks to earth is immediately detected and the equipment immediately switched off.

Where fitted, the fault-finding circuit must be checked regularly, at least once a day, to ensure that it is functioning correctly; if it doesn't, please call in a Service engineer immediately and do not use the equipment.

The equipment is potentially dangerous if not maintained correctly. It is therefore essential that it is serviced regularly by a qualified and competent engineer. Baldwin UV offer a servicing agreement on the basis of twice yearly visits. We strongly recommend that you use this facility.

Air Cooling Interlock

A pressure switch may be fitted on air extraction systems to give safeguard against fan failure which could cause overheating of the equipment and possible damage to adjacent parts. It is necessary to check that this pressure switch is working correctly and this can be done by simply disconnecting the sensor pipe. In this case, the equipment should not operate.

High Voltage Connections

Careful checks should be kept on the lamp connections and high voltage connections within the equipment head to make sure that these do not become dirty or coated with powder or other possible conducting material. They should be cleaned regularly, at least whenever the lamp is changed, possibly more often where a particularly heavily polluted atmosphere occurs. Also, while changing the lamps, a careful check should be made of the high voltage leads to make sure that no deterioration has occurred. Dirty contacts may cause a potential hazard.

Lamphead Cleaning

The air inlets in the reflector head should be regularly checked, so that it is ensured that they have not become blocked with dust or powder and that the air passages are clear.

High Temperatures

It should be noted that the reflector head runs at very high temperatures and the inside components become very hot during operation of the machine and the equipment. Therefore, when maintaining the equipment, a reasonable time should be allowed before access is attempted. Alternatively, precautions should be taken.

Safety UV Curing

U.V. Radiation

UV radiation is generated from UV lamps and can be harmful if operator exposure exceeds recommended levels, (Refer to *U.V. Permissible Exposure Levels* in this section).

All equipment must be adequately guarded, shielded and interlocked to prevent accidental operator exposure.

Equipment should be annually checked for UV radiation levels. Please contact our service department for availability and cost.

Radiation is in the wavelength bands A,B and C. Exposure to UV radiation can result in:

- Reddening of skin.
- Headaches
- Sore eyes

If any symptoms appear, investigations should be carried out.

Though not required under normal operating conditions Baldwin UV can, on request, supply UV safety glasses – Part No. 70509885-01.

First Aid

On skin no treatment can immediately be made, however, soothing cream can be applied to the affected area.

For exposure to eyes medical attention should be sought immediately.

Ozone Gas

Ozone is generated by reaction of short-wave UV radiation on air and is a gas which readily reverts to oxygen when mixed with atmospheric air as it is removed from the source of UV radiation. Quantity of ozone produced equates to 0.001 cu.ft/kW Hr.

NOTE: For DropCure Non Air Extracted Products ozone remains around the UV lamp and does not escape from inside the lamp/reflector housing.

Ozone checks using a Draeger measuring device should be carried out every 6 months, or immediately, if an operator can smell ozone. Please contact our service department for availability and cost.

Outlet duct concentration is 0.3 PPM in a typical system. Threshold limit value is 0.1 PPM in a working atmosphere.

Precautions

Symptoms of ozone present in the working environment.

Ozone has an irritant action on the mouth and throat and the Factory Inspectorate recommendation is that the level of ozone in the atmosphere of a factory should not exceed 0.1 PPM (TLV). Most people can smell ozone at about one third of the TLV. If there is any doubt as to whether the TLV is being exceeded, the company should take measurements to check whether the extraction system is adequate to keep the atmosphere well below 0.1 PPM.

If detected:

- a. Shutdown system.
- b. Check ducting for leaks. (where applicable)
- c. Before starting check working area with ozone meter.

First Aid

If a person is overcome by ozone, the following precautions should be adopted:

- a. Remove the patient to a warm uncontaminated atmosphere and loosen tight clothing at the neck and waist.
- b. Keep the patient at rest.
- c. If the patient has difficulty in breathing, oxygen may be administered provided that suitable apparatus and a trained operator are available.
- d. If breathing is weak or has ceased, artificial respiration should be started. The mouth-to-mouth or mouth-to-nose methods are recommended.
- e. Refer to medical aid.

Ozone poisoning should be treated symptomatically. This may include bed rest, analgesics to relieve pain, and antibiotics as may be prescribed by a medical practitioner.

Further details can be found on Guidance Note EH 38 from the Health and Safety Executive.

Mercury

Mercury is a silver colored liquid which is contained in medium pressure mercury arc lamps. In the case of Primarc lamps this is typically 0.5 – 2g.

Under normal operating conditions mercury presents no hazard as it is contained in the quartz tube of the lamp.

Mercury is toxic and must not be consumed or handled directly on the skin.

It is recommended that protective gloves and eye protection is worn when handling U.V. lamps.

In the event of spillage:

- a. Use personal protective equipment to protect the eyes, the skin, and to prevent ingestion and inhalation.
- b. Contain the spill with wet sand and recover by vacuum suction. Do not use a vacuum cleaner as it will become contaminated and be a source of mercury vapor.
- c. Spread a 50/50 mix of calcium hydroxide and flowers of sulphur over the affected area and allow to dry. Repeat until there is no visible trace of mercury. Special attention should be given to cracks and imperfections in the affected surface.

Lamp Disposal

Sensible precautions should be followed when disposing of Mercury Arc Lamps.

- a. Wrap lamp in a plastic bag, seal and repack in the box provided.
- b. Dispose of the lamp using an approved waste management company or refer to your local authority, alternatively

Contact one of the companies below for details of a disposal service for old lamps:

Primarc Limited
816 Leigh Road
Slough
Berkshire SL1 4BD
Tel: +44 (0)1753 558001

Horizon Lamps Inc.
2 Danforth Drive
Easton, PA 18045 USA
Tel: +1 610 829 4240

First Aid

Eyes - Flush with plenty of water for 15 minutes, occasionally lifting the eyelids. OBTAIN MEDICAL ATTENTION.

Skin - Flush with plenty of soap and water for 15 minutes. Remove contaminated clothes and shoes. OBTAIN MEDICAL ATTENTION.

Ingestion - OBTAIN MEDICAL ATTENTION.

Inhalation - OBTAIN MEDICAL ATTENTION.

Further details can be found on Guidance note EH 17 from the Health and Safety Executive.

U.V. Ink and Generated Products

The relevant safety data sheets from the ink manufacturer must be followed when handling UV inks.

With some solvent based inks and varnishes there is a potential for the release of flammable substances during the printing process. These are not suitable for use with a UV drying system. Always consult the manufacturer and the manufacturer's data sheets before use with the UV drying system.

The materials used in UV inks and varnishes are of a toxic nature. Before handling, it is essential all operators are conversant with the instructions provided by the supplier of these materials as to their safe use and disposal.

During operation, there is a possibility that odor (a smell) may be generated.

With DropCure systems, because of the lower operating temperatures, there is not generally a significant odor produced.

The formation of spray mist from printing ink is particularly dependant on the ink used and the printing speed. If spray mists occur, the printing speed should be reduced. Ink mist extraction systems should be installed if necessary.

System Checks

Baldwin UV will undertake to check an installation for ozone and UV radiation.

Please contact our Service Department for availability and costs.

U.V. Permissible Exposure Levels

Permissible Ultra Violet Exposures As Recommended By The American Conference Of Government And Industrial Hygienists

Duration of Exposure (per day)	Effective Irradiance E Micro Watts/cm sq.
8 hours	0,1
4 hours	0,2
2 hours	0,4
1 hours	0,8
30 minutes	1,7
15 minutes	3,3
10 minutes	5,0
5 minutes	10
1 minute	50
30 seconds	100
10 seconds	300
1 second	3000
0,5 seconds	6000
0,1 seconds	30000

Permissible exposure time in seconds for exposure to actinic ultra-violet radiation incident upon the unprotected skin or eye may be determined with reference to table above, which provides exposure times corresponding to effective irradiance in micro watts/cm sq.

Section 2

Description

U.V. Curing

Description

U.V. light source is medium pressure mercury arc (MPMA) lamps. These lamps are installed in individual lamp heads after specific color/coating stations. Service connections are provided by flexible conduits.

Ultra-violet curing is achieved by a chemical reaction in special inks and coatings when U.V. energy is focused on them. Curing efficiency depends on U.V. power, ink weight, machine speed, type of substrates and other factors.

When printing onto PVC substrates and curing with UV lamps it is necessary to ensure that the PVC material is designed for printing UV offset inks/coatings.

Within the specification of the PVC it is necessary to state that the PVC is to:

1. be suitable for UV printing.
2. have suitable UV/heat stabilizers.

The purpose of the UV/heat stabilizers is to ensure that there is no degradation (*known as dehydrochlorination*) of the PVC during the printing/curing process. The product of the degradation process is a corrosive gas (*hydrogen chloride*) that can have a detrimental effect on any ferrous or aluminium components within the printing press.

As well as ultra-violet light, the high energy lamps radiate considerable heat and a cooling system is required to take away the excess and ensure that the lamps, their housings, the machines and the inks or varnishes remain at an acceptable temperature.

The lamps, by their very nature, cannot be switched on or off instantly so they are controlled to switch to a reduced power level when the machine is running in the idle mode.

The unit must be fitted with safeguard systems which prevent the operation of the system in an unsafe condition and indicate any faults which might occur.

Shielding is required to ensure the stray heat and U.V. radiation meet agreed safety criteria.

Reflectors are manufactured from pure aluminium, anodized for protection and treated to give maximum U.V. reflectivity.

Ultra Violet Lamps

The lamp is the heart of the U.V. system. Baldwin UV use Medium Pressure Mercury Arc.

Lamps have various powers from 40w/cm to 240w/cm depending on area of use.

Lamps and controls are carefully matched to give optimum U.V. output and power requirements. For this reason it is extremely important that only genuine Baldwin UV replacement lamps are used, as alternatives may damage the control or overheat the reflector system. The system warrantee is void if genuine Baldwin UV lamps are not used. These are readily available through our Agent or Service Department.

Lamp Head and Mounting

System comprises lamp head units which are mounted to the process equipment.

Filtered Lamp Head

A filtered Lamp Head consists of a UV Lamp that is surrounded on three sides by a reflector housing. The reflector is mounted on to a water cooled extruded aluminium heat sink. A further water cooled heatsink can be installed below the substrate to assist in the cooling process. A water cooled Quartz tube is fitted on the fourth side of the lamp for Infrared filtration.

Negligible ozone is created and extraction from the lamp housing is not required.

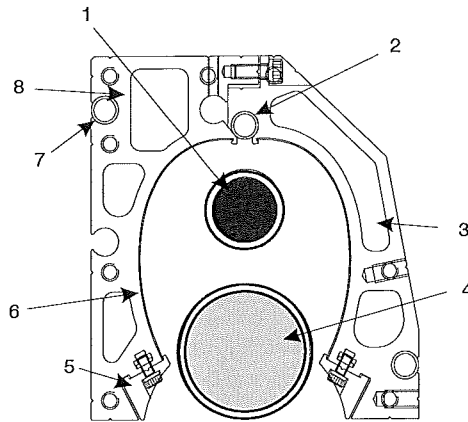


Illustration 13A

1. DropCure Lamp Head End View

- | | | |
|---------------------------|----------------------|---------------------|
| 1. U.V. Lamp | 4. Quartz Water Tube | 7. Cable Channel |
| 2. Compressed Air Cooling | 5. Reflector Clamp | 8. Water Cooled Top |
| 3. Water Cooled Sides | 6. Reflector | |

Cooling

On the DropCure systems

The unit consists of a 3 part water cooling system.

1. Reflector and lamp housing.
2. Quartz tubes in front of the lamps to filter out I.R.
3. Water cooled Heatsink to control heat build-up in substrate.

Water cooling is provided by a heat exchanger.

The coolant water must be deionized water with a conductivity of 20micro siemens or less. This must be checked weekly to prevent contamination, ensuring maximum U.V. output.

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Section 3

Maintenance



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.
Work on electrical parts is only to be executed by electrically qualified personnel.

Routine Maintenance Schedules

Always isolate electrical supply before maintenance.

Daily Maintenance	Action
Earth leakage	Test
Lamphead service connections	Inspect for damage
Shielding	Check if fitted and satisfactory
Water services	Check for damage

Service intervals are typical figures and may be adjusted to suit the operating conditions.

Always isolate electrical supply before maintenance.

Maintenance Number 1 Every 100 hours or Weekly	Action
Lamps	Check cleanliness and clean if required (See 3-7)
Reflectors	Check cleanliness and clean if required (See 3-7)
Cooling tubes	Check cleanliness and clean if required (See 3-7)
Fans and fan inlets (if fitted)	Check cleanliness and clean if required
Conductivity of cooling water	Check below 20 μ s and replace D.I. resin if necessary (See cooler manual)

Always isolate electrical supply before maintenance.

Maintenance Number 2 Check Every 1000 hours or 2 Monthly	Action
Lamps	Check and replace if necessary
Lampheads and UV press parts	Check and clean
Lamphead electrical connections	Check and clean
Remove all traces of dirt from HT connections	Clean
All plumbing connections inside lamphead for leaks	Check, adjust, replace if necessary
Pneumatic tubes and piping for leaks	Check, adjust, replace if necessary
Water hose and piping for leaks, tighten hose clips where loose	Check, adjust, replace if necessary
Ducting for blockages, damage and leaks	Check and clean
Compressed air filter regulator	Check and replace filter if necessary (replace filter at least 6 monthly)

Always isolate electrical supply before maintenance.

Maintenance Number 3 Check Every 5000 hours or Yearly	Action
Lampheads remove from press when necessary, replace worn parts	Check and clean thoroughly
Lubricate mechanisms with high temperature lubricant	Lubricate
Electrical connections for tightness	Check and clean
Plugs and sockets for integrity	Check and clean
Lamphead brackets and fixings including shielding	Check and tighten
Hose connections and quick release fittings for function and build_up of debris	Check and clean
Inspect and check electrical connections, replace components where necessary	Check and clean
Fans and motors, Electrical connections and characteristics	Check and tighten
Compressed air filter regulator	Replace filter

Safety Precaution While Servicing

Important Information

All electrical maintenance and servicing must be carried out by a qualified competent electrical engineer. It is preferable to call in Baldwin UV for this servicing facility.



WARNING: This equipment operates at high voltage and is therefore potentially dangerous. All precautions must be taken by the electrical engineer in servicing this equipment. The mains switch must be locked in the off position and the equipment must be isolated at the mains before opening any of the access doors.

In the event of your electrician being unable to find fault with the equipment, then the Baldwin UV Service should be called in.

Earth Leakage

This equipment may be fitted with a high voltage leak detector circuit. This means that any fault occurring where high voltage leaks to earth is immediately detected and the equipment immediately switched off.

Where fitted, the fault-finding circuit must be checked regularly, at least once a day, to ensure that it is functioning correctly; if it doesn't, please call in a Service engineer immediately and do not use the equipment.

The equipment is potentially dangerous if not maintained correctly. It is therefore essential that it is serviced regularly by a qualified and competent engineer. Baldwin UV offer a servicing agreement on the basis of twice yearly visits. We strongly recommend that you use this facility.

Air Cooling Interlock

A pressure switch may be fitted on air extraction systems to give safeguard against fan failure which could cause overheating of the equipment and possible damage to adjacent parts. It is necessary to check that this pressure switch is working correctly and this can be done by simply disconnecting the sensor pipe. In this case, the equipment should not operate.

High Voltage Connections

Careful checks should be kept on the lamp connections and high voltage connections within the equipment head to make sure that these do not become dirty or coated with powder or other possible conducting material. They should be cleaned regularly, at least whenever the lamp is changed, possibly more often where a particularly heavily polluted atmosphere occurs. Also, while changing the lamps, a careful check should be made of the high voltage leads to make sure that no deterioration has occurred. Dirty contactors may cause a potential hazard.

Lamphead Cleaning

The air inlets in the reflector head should be regularly checked, so that it is ensured that they have not become blocked with dust or powder and that the air passages are clear.

High Temperatures

It should be noted that the reflector head runs at very high temperatures and the inside components become very hot during operation of the machine and the equipment. Therefore, when maintaining the equipment, a reasonable time should be allowed before access is attempted. Alternatively, precautions should be taken.

Maintenance of Lamps & Reflectors

The cooling water is fed into one side extrusion, then through the cooling tube, then through the other side extrusion before leaving. This design therefore reduces the number of water connections and makes lamp changing easier.



CAUTION: Do not use any abrasive substances on the reflectors or lamps. Follow the instructions detailed in paragraph *Cleaning* of this Section.

To Change the Lamp

1. Isolate the Drying System and padlock the main isolator in the 'off' position. Isolate the press and padlock the main isolator in the 'off' position. Turn off the air supply.
2. Remove, hinge up or lift out unit so that access can be gained to the three M4 x 10 cap head screws along the length of the lamp spine.
3. Remove the light shield if fitted.
4. Remove the three M4 x 10 screws and the lamp head will hinge open.
5. To remove the lamp, disconnect the lamp terminals from the lamp ends.

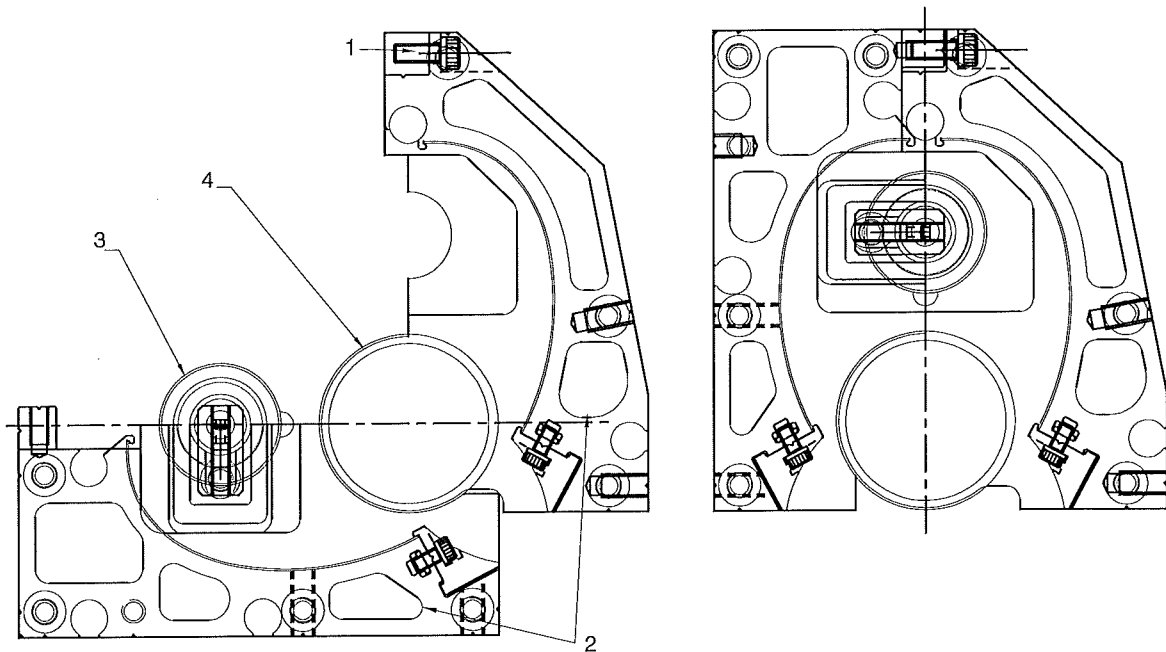


Illustration 14A

- 1. To access lamp, remove the 3 M4 x 10 cap head screws and the lamp head hinges open.
- 2. Water cooled extrusions
- 3. UV Lamp
- 4. Water cooling tube

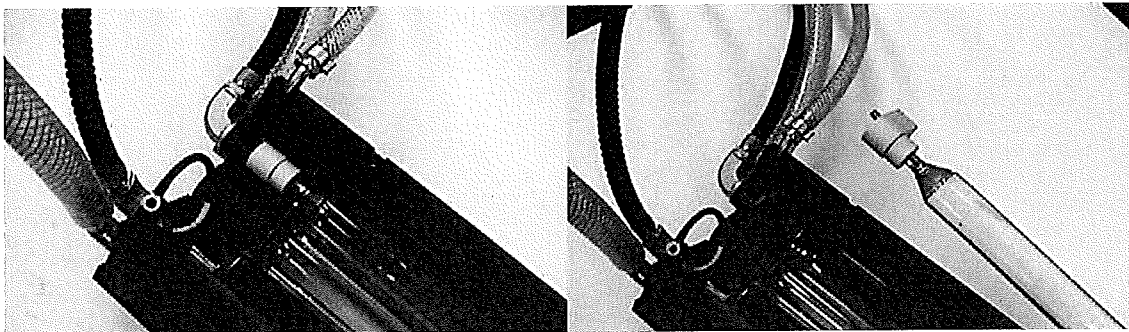


Figure 2-1 Lamp removal

CAUTION: The lamps must not be handled directly, as skin acids will permanently mark the quartz sleeve.

- 6. Clean the reflectors as instructed in paragraph *Cleaning* of this Section.

NOTE: Do not use abrasive compounds, as they will mark the quartz jacket and the reflector coating.

7. Once all parts have been allowed to dry, the new lamp should be inserted into its location and the high tension terminals secured.
8. Close the lamp head on its hinge and secure using the 3 M4 x 10 screws removed in step 4.
9. Fix the lamp head into the curing position making sure all safety switches are aligned correctly and any light guards are securely in place.
10. Record the lamp hour reading.
11. Switch on the air and electrical supplies.

Removal and Cleaning of Cooling Tubes¹

External

Clean with pure alcohol or ethanol. A Stanley knife blade can be used on stubborn or burnt on deposits.

Internal

Remove lamps as details above.

Remove the four end plates as required and gently slide the two sections of the lamphead apart. Drain the water and lay the cooling tube on a flat surface.

Clean using a nylon bottle brush in conjunction with alcohol and a mild abrasive cleaner. If the tubes are heavily contaminated or contamination is burnt-on, it may be necessary to replace the tubes. Tubes must be thoroughly rinsed in water before re-assembly (any cleaning material residue will contaminate the water cooling system).

It is recommended that each time the cooling tube assembly is stripped down, the sealing 'O' rings are replaced on re-assembly.

When replacing 'O' rings ensure that the 'O' ring groove is clean and free from dirt etc. (This could result in incorrect sealing). Lightly smear 'O' rings in silicone grease, before insertion into groove.

Lightly smear the ends of the cooling tubes with silicone grease, then push gently into the end blocks.

Re-assemble the lamp head. Slight adjustment of the cooling tube may be necessary to ensure it is central, between the two mounting manifolds.

Reconnect water services, check for leaks and re-fit lamps as detailed in paragraph *To Change the Lamp* of this Section.

NOTE: Before turning on U.V. lamps a visual check that all air has been purged from the cooling tubes must be made.

Cleaning

The cleaning of lamps² and reflectors³ should be carried out with great care as follows:

- Use a clean lint free cotton cloth.
- Soak the cloth with a solvent such as pure alcohol, methanol or ethanol.
- Applying only a moderate pressure wipe the surfaces clean.
- When completed wipe of any residual solvent using a clean dry lint free cotton cloth.

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Section 4

Parts

Introduction

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	

4-2 Parts

Item	Part	Description	Quantity	Note
NS	7350152	Lamp Head (75mm Arc)	1	
NS	7350388	Lamp Head (100mm Arc)	1	
NS	7350392	Lamp Head (150mm Arc)	1	
NS	7350390	Lamp Head (250mm Arc)	1	
NS	7350389	Lamp Head (350mm Arc)	1	
NS	7350391	Lamp Head (410mm Arc)	1	
1	7350160	• Main Dichroic Reflector (108mm Lg - 75mm Arc)	2	
1	7350366	• Main Dichroic Reflector (133mm Lg - 100mm Arc)	2	
1	7350368	• Main Dichroic Reflector (183mm Lg - 150mm Arc)	2	
1	7350394	• Main Dichroic Reflector (142.5mm Lg - 250mm Arc)	2	A
1	7350395	• Main Dichroic Reflector (142.5mm Lg - 250mm Arc)	2	A
1	7350210	• Main Dichroic Reflector (221mm Lg - 350mm Arc)	2	B
1	7350367	• Main Dichroic Reflector (163mm Lg - 350mm Arc)	2	B
1	7350210	• Main Dichroic Reflector (221mm Lg - 410mm Arc)	4	
2	7350158	• Cooling Tube CT169 (75mm Arc)	1	
2	7350362	• Cooling Tube CT194 (100mm Arc)	1	
2	7350363	• Cooling Tube CT245 (150mm Arc)	1	
2	7350393	• Cooling Tube CT344 (250mm Arc)	1	
2	7350364	• Cooling Tube CT444 (350mm Arc)	1	
2	7350365	• Cooling Tube CT504 (410mm Arc)	1	
3	7350208	• Left Hand End Reflector	2	
4	1057682	• Cooling Tube 'O' Ring	2	
5	7350161	• Thermistor	1	
6	7350397	• Gasket - Manifold 'B'	2	
7	7350209	• Right Hand End Reflector	2	
8	7350396	• Gasket - Manifold 'A'	2	
NS	7350211	• Quick Release Assy - Water	2	
NS	1056694	• • Socket	1	
NS	1057002	• • Plug	1	
NS	7350593	• • Hose Adaptor 5/8" x 3/4"BSP	2	
NS	7350212	• Hose Black Silicon 5/8"	2m	
NS	1056828	• LXTS Conduit 10mm ID	20m	
NS	1057635	• Cable HV HT	22m	
NS	7350540	• Cable HT Earth	12m	
NS	1057666	• Quick Release Plug - Pneumatic	2	
NS	1057670	• Hose 5/16" Braided	10m	
NS	7350586	• Plug HT/LT + Air	1	
NS	1056870	• • Hood	1	
NS	1056899	• • Plug Kit	1	
NS	7350588	• • • Frame 4 Module Hood	1	
NS	7350589	• • • HT Male Insert	1	
NS	7350597	• • • LT Male Insert	1	
NS	1056867	• • • Pneumatic Insert	1	
NS	1056679	• • • Contact Male 2.5mm ²	2	
NS	1056677	• • • Contact Male 1mm ²	12	
NS	1056869	• • • Contact Male 3mm Pneumatic	2	
NS	7350153	UV Lamp (Hg)- S7388 (75mm Arc)	1	
NS	7350524	UV Lamp (Pb)- S7629 (75mm Arc)	1	
NS	7350501	UV Lamp (Fe)- S7416 (75mm Arc)	1	

Item	Part	Description	Quantity	Note
NS	7350369	UV Lamp (Hg)- S7392 (100mm Arc)	1	
NS	7350536	UV Lamp (Pb)- S7396 (100mm Arc)	1	
NS	7350371	UV Lamp (Hg)- S7365 (150mm Arc)	1	
NS	7350537	UV Lamp (Pb)- S7506 (150mm Arc)	1	
NS	7351438	UV Lamp (Fe)- S7399 (150mm Arc)	1	
NS	7350525	UV Lamp (Hg)- S7630 (250mm Arc)	1	
NS	7350538	UV Lamp (Pb)- S7614 (250mm Arc)	1	
NS	7350398	UV Lamp (Fe)- S7483 (250mm Arc)	1	
NS	7350539	UV Lamp (Hg)- S7366 (350mm Arc)	1	
NS	7350283	UV Lamp (Pb)- S7407 (350mm Arc)	1	
NS	7350282	UV Lamp (Fe)- S7406 (350mm Arc)	1	
NS	7350526	UV Lamp (Hg)- S7631 (410mm Arc)	1	
NS	7350311	UV Lamp (Pb)- S7601 (410mm Arc)	1	

NOTE A: 2 off of each required for 250mm arc lamphead.
B: 2 off of each required for 350mm arc lamphead.
C: Optional
X:
AR: As Required
NS: Not Shown

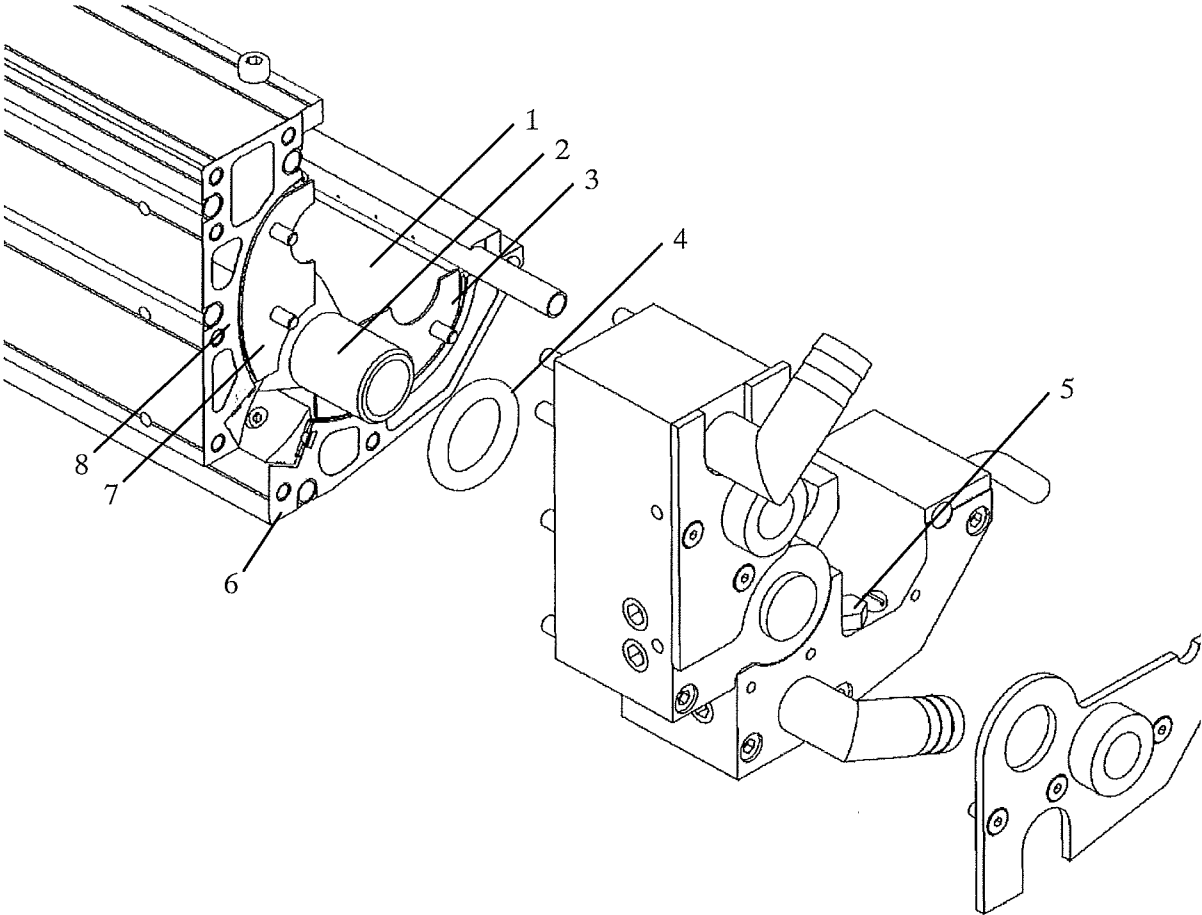
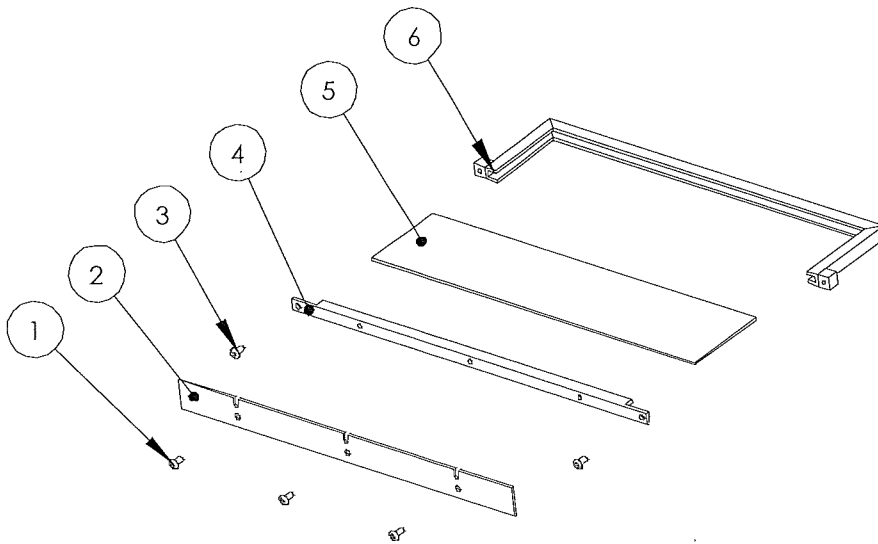


Figure 4-1 DropCure Lamp Head

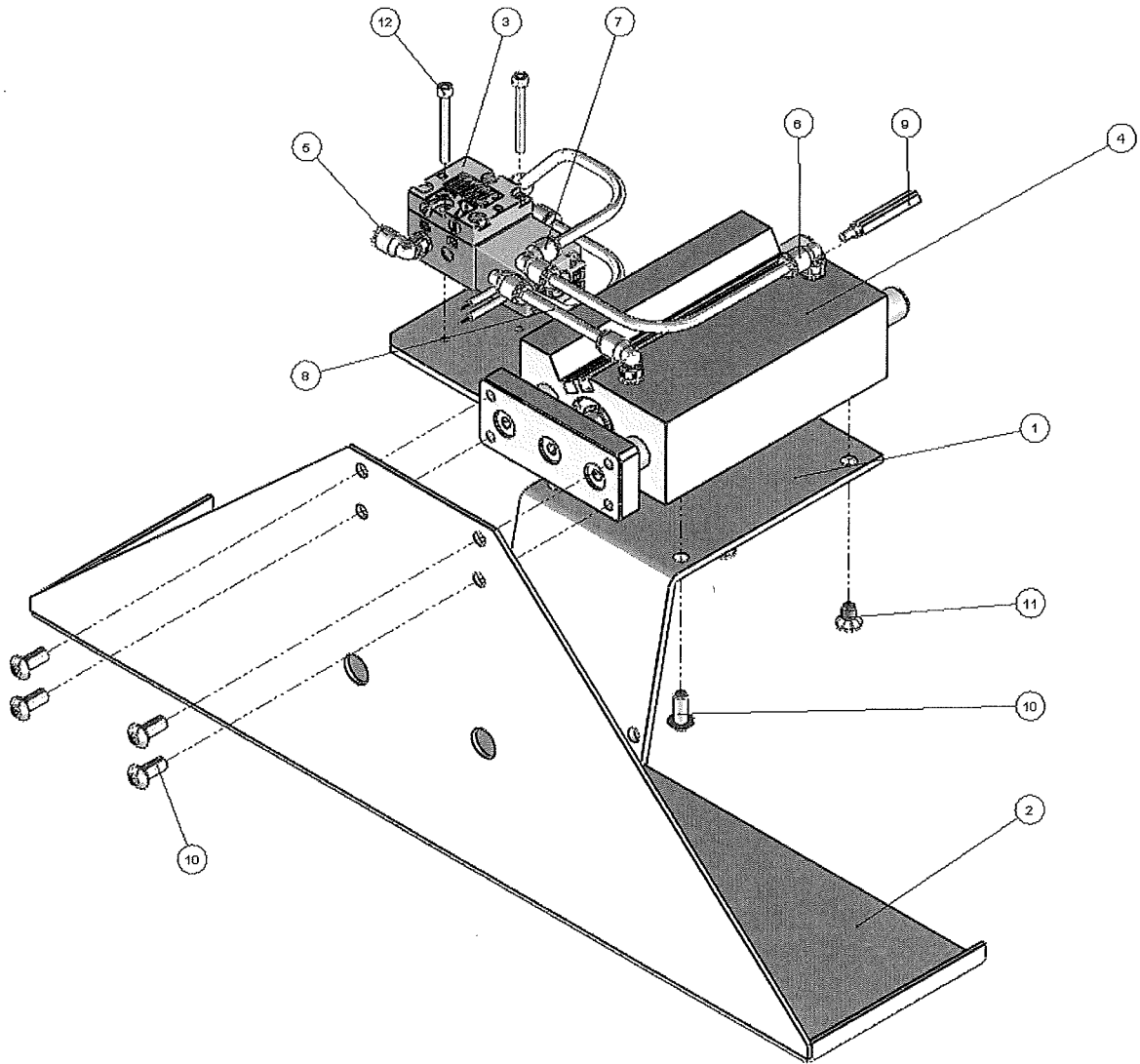
Item	Part	Description	Quantity	Note
-	7350584	Quartz Plate Assy - 250mm Arc	1	
1	-----	• Screw M5 x 6 Socket Button	3	
2	7350651	• Mounting Plate - 250mm Arc	1	
3	-----	• Screw M5 x 12 Socket Button	2	
4	7350650	• Frame End - 250mm Arc	1	
5	7350585	• Quartz Plate - 250mm Arc	1	
6	7350649	• Frame - 250mm Arc	1	

NOTE A:
 B:
 X:
 AR: As Required
 NS: Not Shown



4-6 Parts

Item	Part	Description	Quantity	Note
-	00510008-06	Shutter Assy - 250mm Arc	1	
1	50320850-01	• Mounting Plate	1	
2	50214562-02	• Shutter - 250mm Arc	1	
3	32416801-01	• Shutter Solenoid Valve	1	
4	18418080-01	• Shutter Cylinder	1	
5	32417629-06	• Elbow 4mm x M5	3	
6	32417629-04	• Elbow 4mm x 1/8	2	
7	32418129-01	• Elbow 4mm	2	
8	33406825-01	• Tube 4mm Teflon	AR	
9	18418082-01	• Reed Switch	2	
10	-----	• Screw M5 x 12 Socket Button	6	
11	-----	• Screw M5 x 8 Socket Countersunk	2	
12	-----	• Screw M3 x 30 Socket Cap	2	
NOTE A: B: X: AR: As Required NS: Not Shown				



Test Sheet

BALDI

SYSTEM TEST SHEET

Job Number Job Name

Country Language

Manuals System manual

Details

Lamphead type	<input type="text" value="DC150"/>	Serial Number	<input type="text" value="1100-1-s101"/>
Shutter	<input type="text" value="yes"/>	Serial Number	<input type="text" value="H705K030"/>
Power supply	<input type="text" value="E3"/>	Serial Number	<input type="text" value="NA"/>
Cooler type	<input type="text" value="NA"/>		
Circuits Number	<input type="text" value="NA"/>		

Air 1 valve free flow setting	<input type="text" value="15"/>	l/min
Air 2 valve free flow setting	<input type="text" value="30"/>	l/min
Air 3 valve free flow setting	<input type="text" value="60"/>	l/min

Lamphead cooling distribution ok?	<input type="text" value="YES"/>
Shutter operation ok?	<input type="text" value="YES"/>
Flash test complete?	<input type="text" value="YES"/>
Earth Bond test complete?	<input type="text" value="YES"/>
Power supply set?	<input type="text" value="YES"/>
Lamphead flushed with water?	<input type="text" value="YES"/>

Lamp	Lamp Type	Recommended for moderate Cycling Duty = Using 2 Air Valves						
		Demand %	Volts	Amps	Watts	W/cm	Air 1	Air 2
Standby		30	NA	NA	67	4	On	Off
		60	NA	NA	120	8	OFF	ON
Full Power		100	NA	NA	200	13	ON	ON
						0		
						0		

Lamp	Lamp Type	Recommended for Continuous Duty = Using 3 Air Valves						
		Demand %	Volts	Amps	Watts	W/cm	Air 1	Air 2
7352820	HG							
Standby		30				0	On	Off
		60				0	Off	On
Full Power		100				0	On	On
						0		
						0		

UV Lamp Specification

Lamp type	<input type="text" value="400"/>	V	<input type="text" value="9"/>	A	<input type="text" value="HG"/>	doped
Arc	<input type="text" value="150"/>	mm	<input type="text" value="240"/>	W/cm	<input type="text" value="3.6"/>	kW

Tested By Date

	Earth Bond & Insulation Test Certificate
Serial Number:	1100-1-s101
Customer:	WAGNER

IMPORTANT NOTE:

1. Prior to commencing these tests, it is essential for the tester to be fully conversant with the
2. For continued safe operation of the equipment it is essential that these tests be repeated annually by

A: EARTH BOND TEST

Resistance from individual metal parts to main earth terminal **MUST** be less than 0.10Ω

	Production
Max. earth bond resistance	<0.1
Max. resistance location	NONE FOUND
Test Passed	Yes

C: FLASH TEST

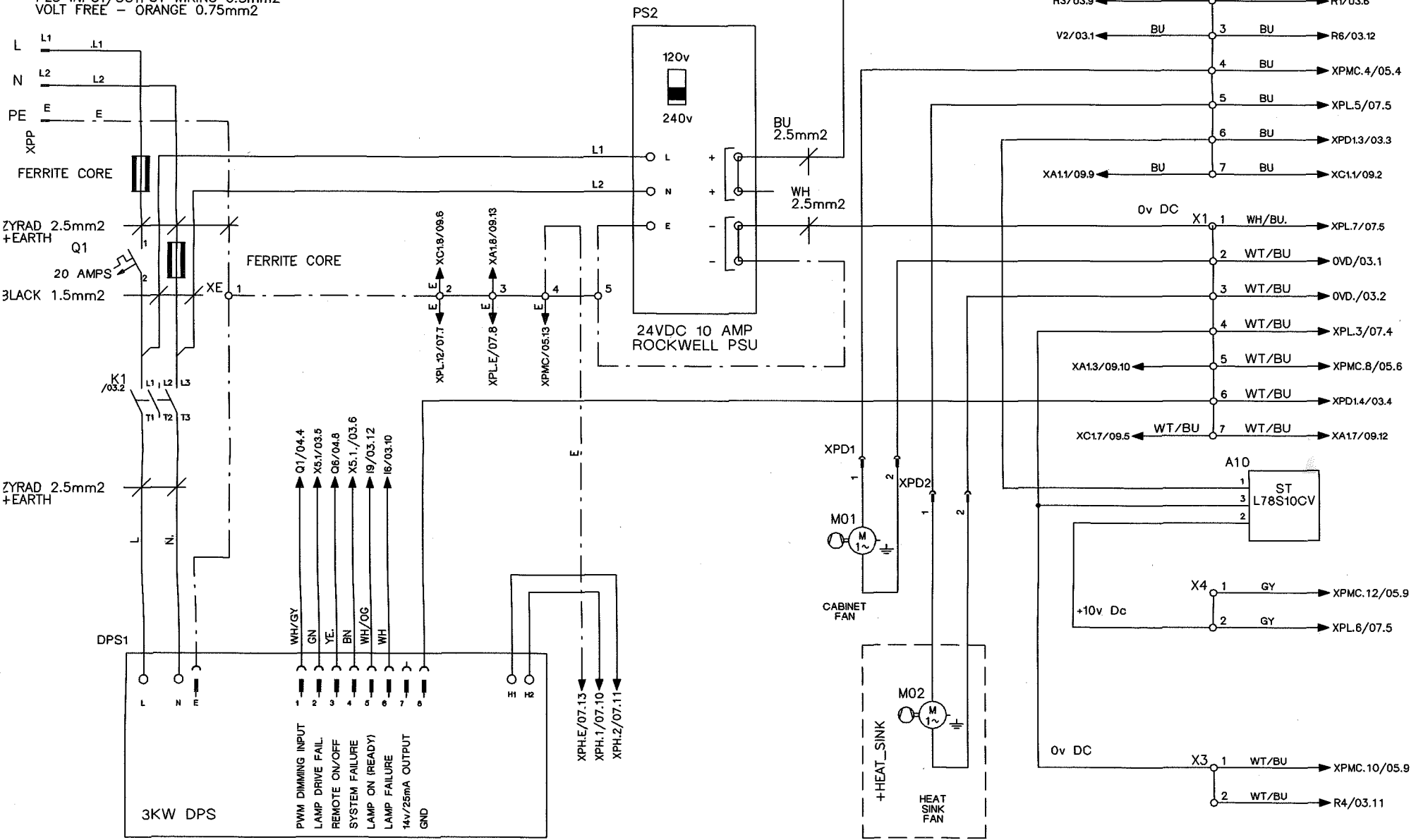
Test electrical breakdown strength of circuit items at specified voltage for 1 minute (exclude all electronic items from this test). Note: $V_{TEST} = 1500V + (1.4 \times V_{MAX})$ Max up to 4KV on site. Connect to h1 with test wires to test caps and transformers

	Production
Power Circuit (HT) 2500VAC	0.32ma
Insulation Test Passed	Yes

This is to certify that the equipment has successfully passed the test requirements	
Test Engineer	steve jordan
Date	22/11/2016

WIRING NOTES

POWER - BLACK
 24V DC - BLUE 0.5mm2
 PLC INPUT/OUTPUT WIRING 0.5mm2
 VOLT FREE - ORANGE 0.75mm2



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ISSUE	D/MAN	DATE
A	MCS	08.02.08
F	MCS	02.06.08

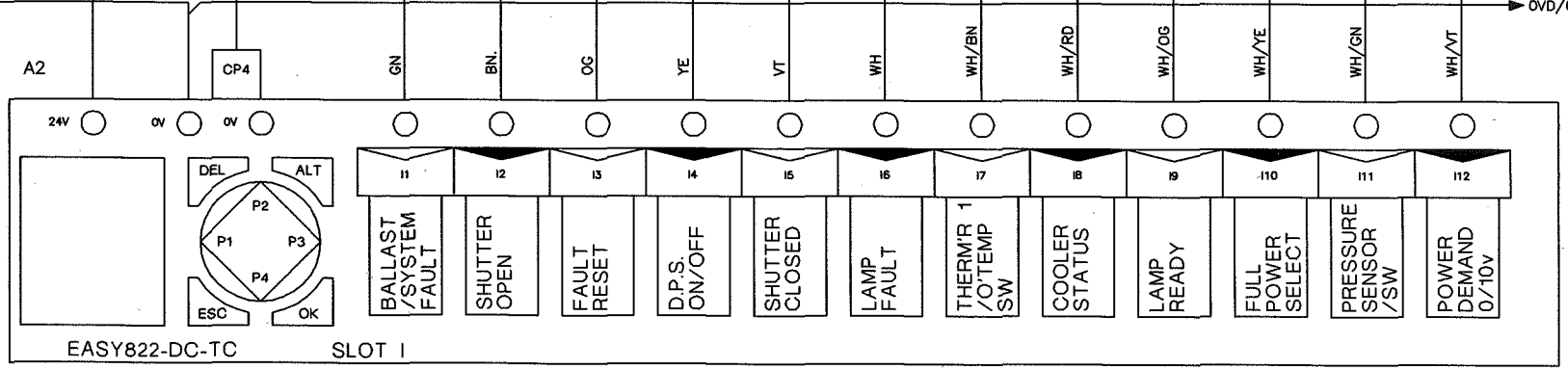
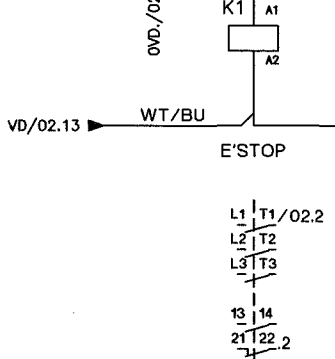
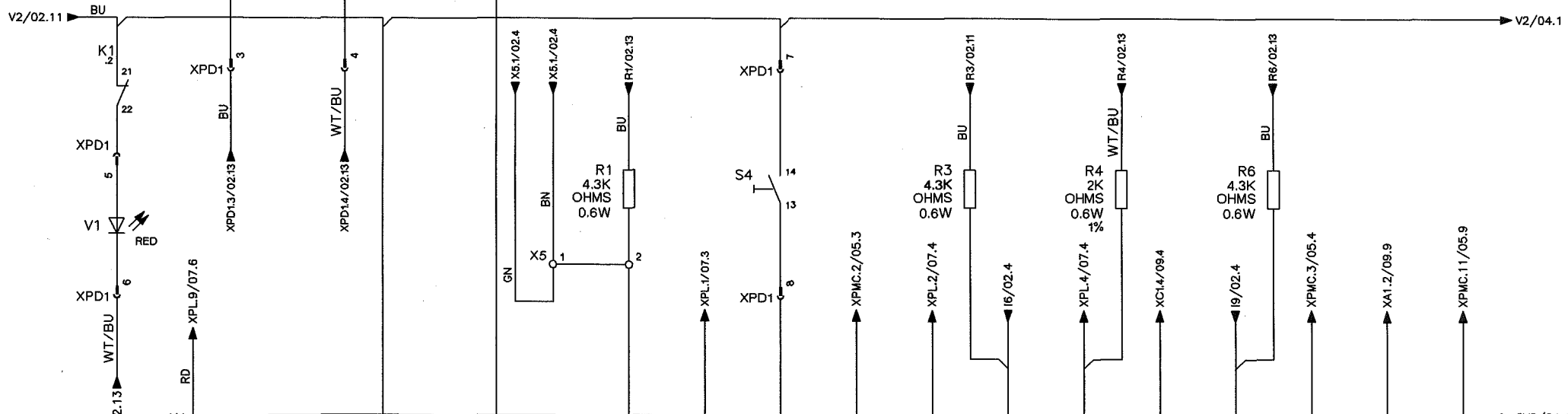
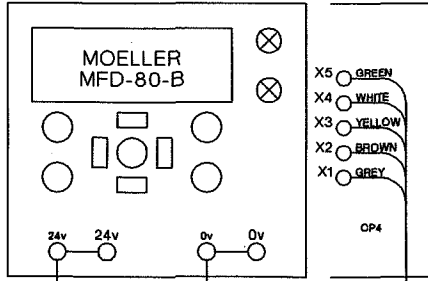
DRWG. MODS. REFORM INDEX AFTER MODS.
 B) FERRITE CORES ADDED
 C) XPP CONNECTOR ADDED
 D) FERRITE CORE MOVED, XPD2 ADDED

3KW W'COOLED SYSTEM
 CABINET
 POWER SUPPLIES

J6360A-3

DRG.No.	LATEST ISSUE
7352063	02 F
SHEET 02 OF 12	

A21



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ISSUE	D/MAN	DATE
A	MCS	08.02.08
F	MCS	02.06.08

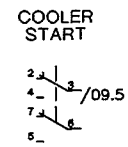
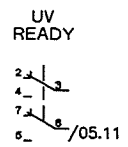
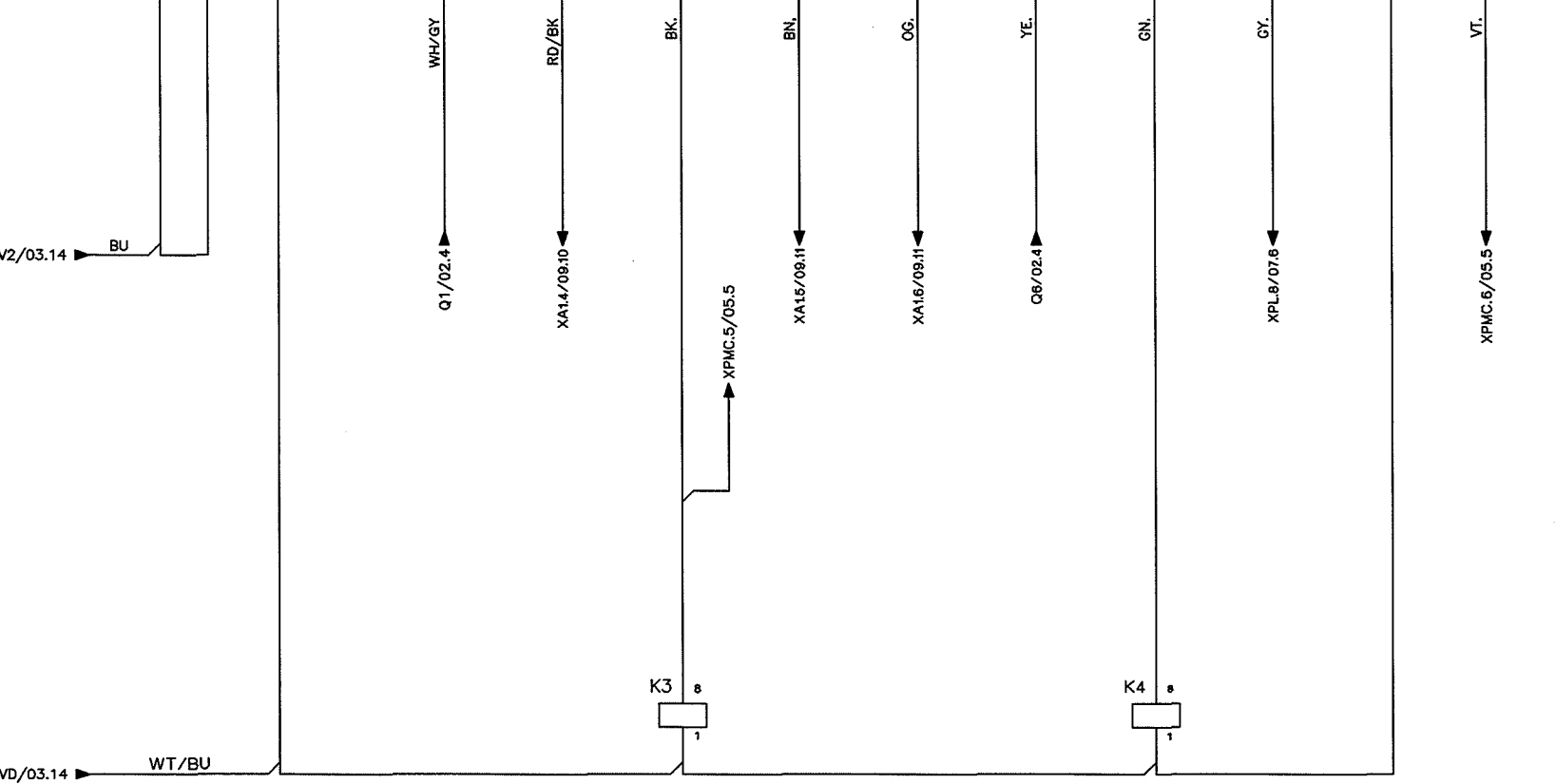
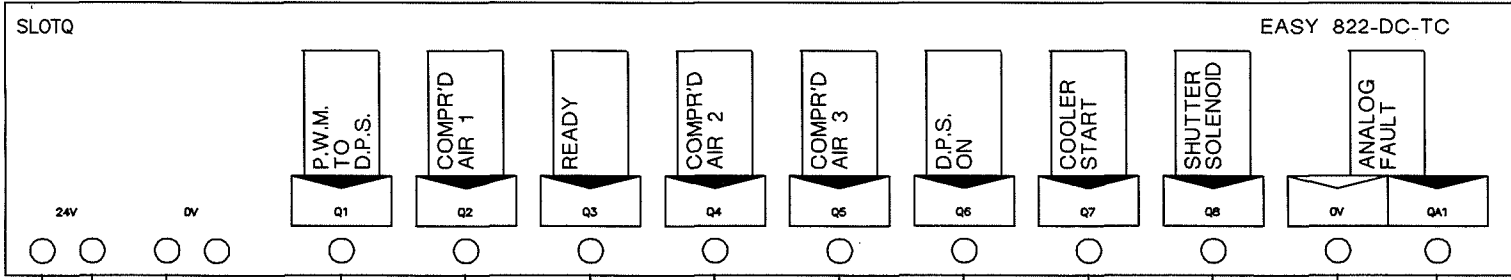
DRWG. MODS. REFORM INDEX AFTER MODS.

3KW W'COOLED SYSTEM
CABINET
PLC INPUTS

J6360A-3

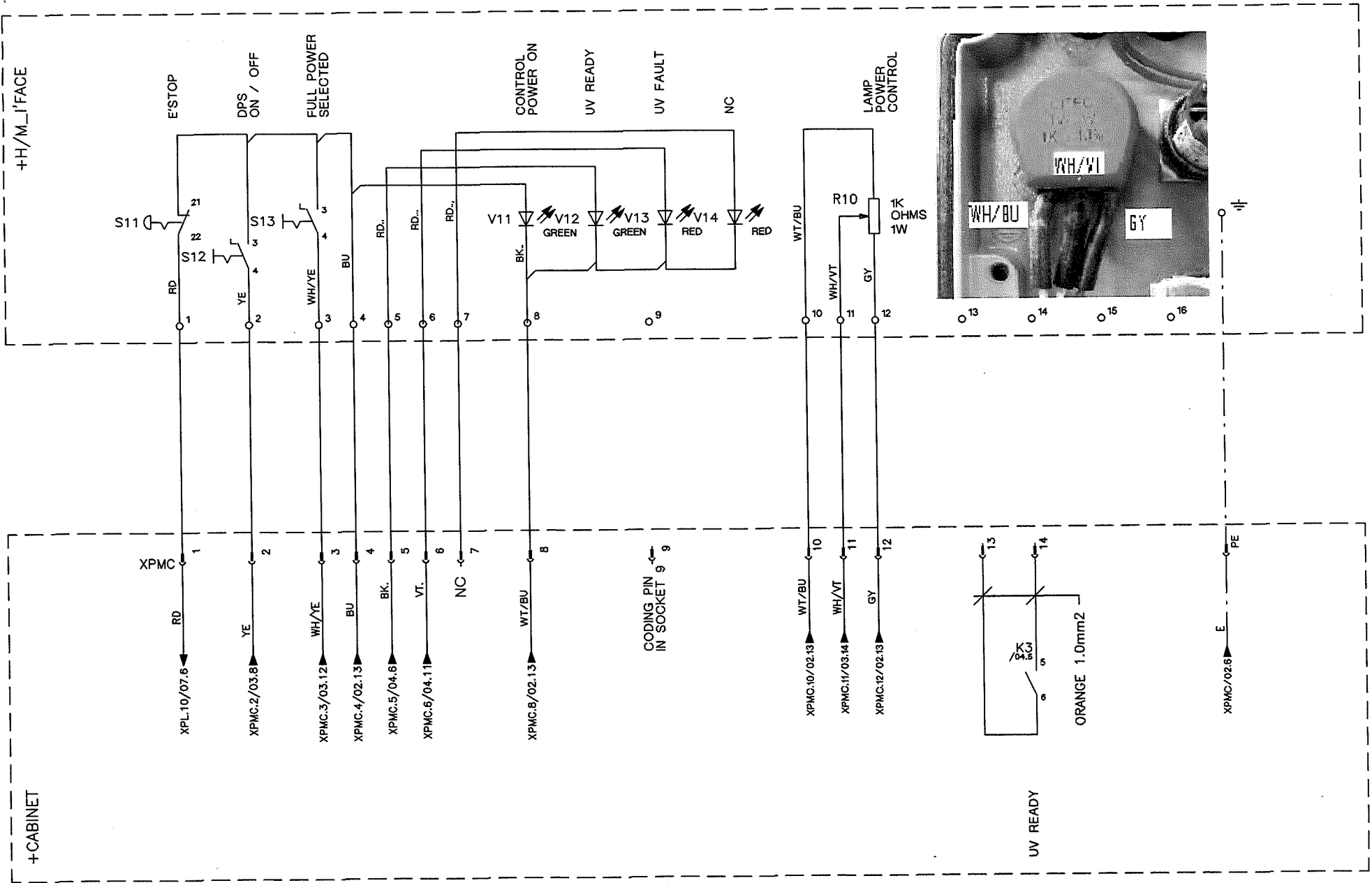
DRG.No.	LATEST ISSU
7352063	03 F
SHEET 03 OF 12	

N/A



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	ISSUE A	D/MAN MCS	DATE 08.02.08	DRWG. MODS.				SHEET 04 OF 12	
	ISSUE F	D/MAN MCS	DATE 02.06.08	DRWG. MODS.				SHEET 04 OF 12	

N/A



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DRWG. MODS. REFORM INDEX AFTER MODS.

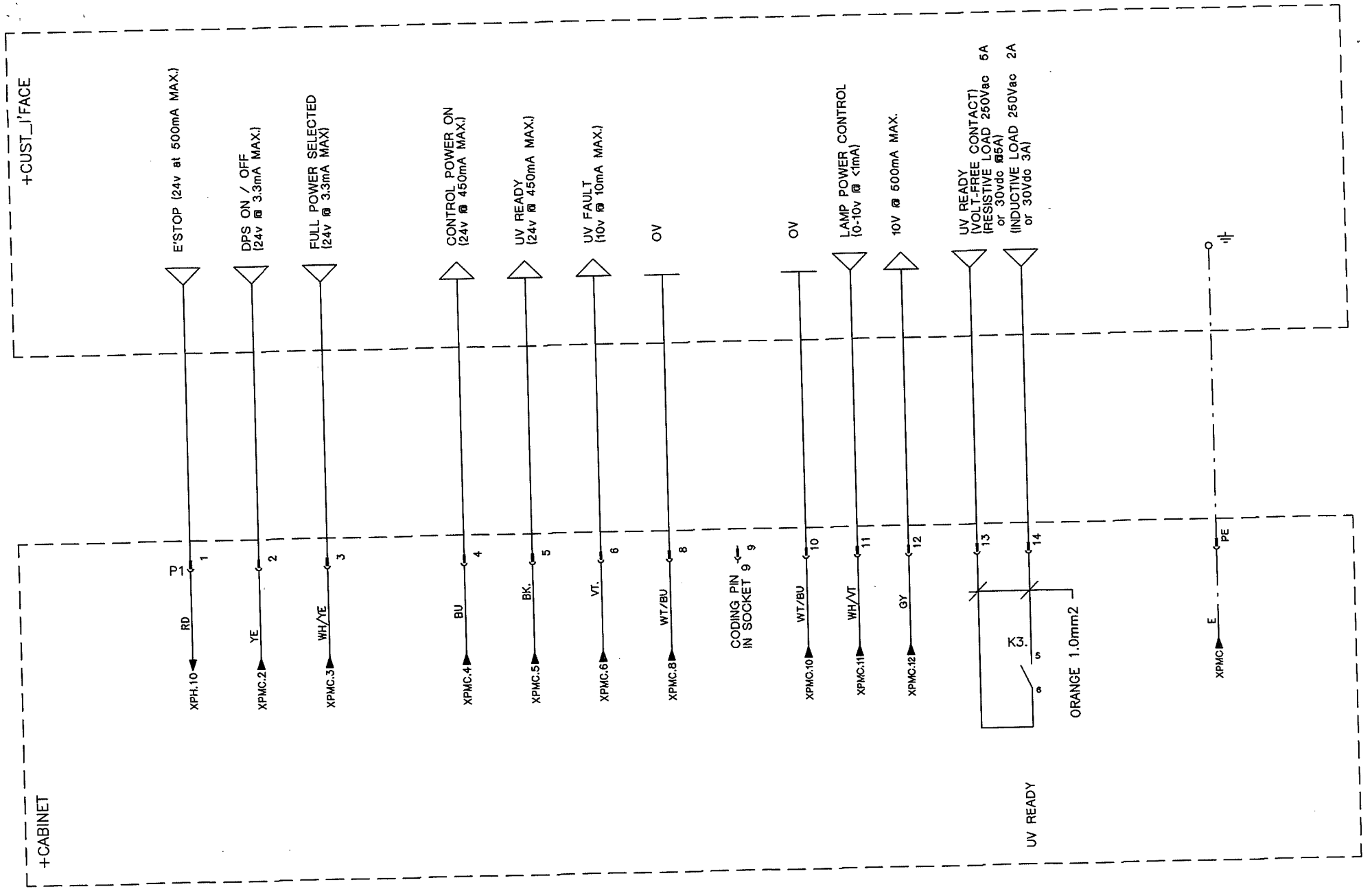
LAMP POWER CONTROL CONNECTIONS CHANGED

3KW W-COOLED SYSTEM
PRESS INTERFACES

J6360A-3

DRG.No. 7352063 LATEST ISSUE 05 F

SHEET 05 OF 12



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ISSUE	D/MAN	DATE
A	MCS	08.02.08
F	MCS	02.06.08

DRWG. MODS. REFORM INDEX AFTER MODS.

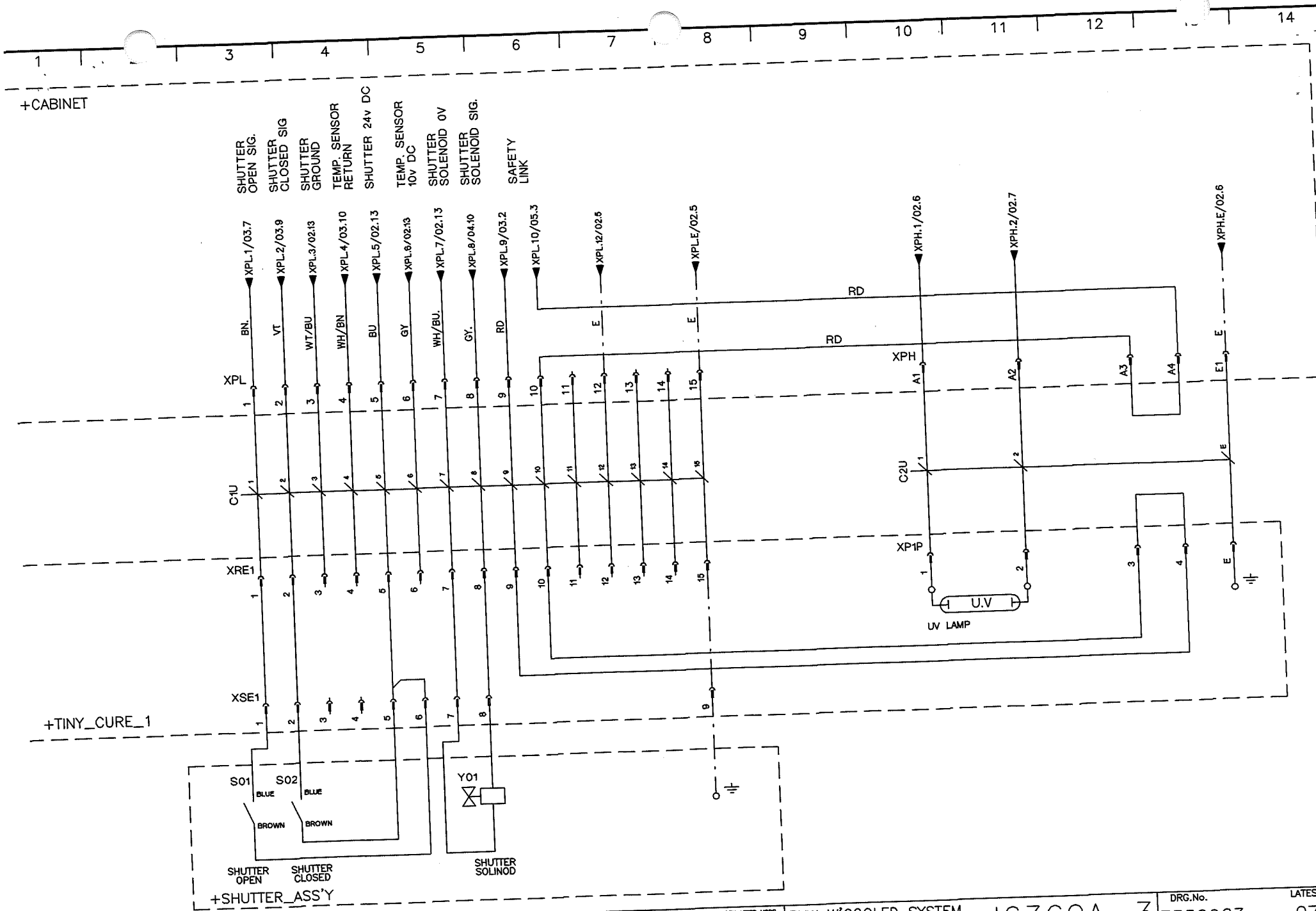
'LAMP POWER CONTROL' CONNECTIONS CHANGED

3KW W'COOLED SYSTEM
PRESS
CUSTOMER INTERFACES

J6360A-3

DRG.No. 7352063 LATEST ISSUE 06 F

SHEET 06 OF 12



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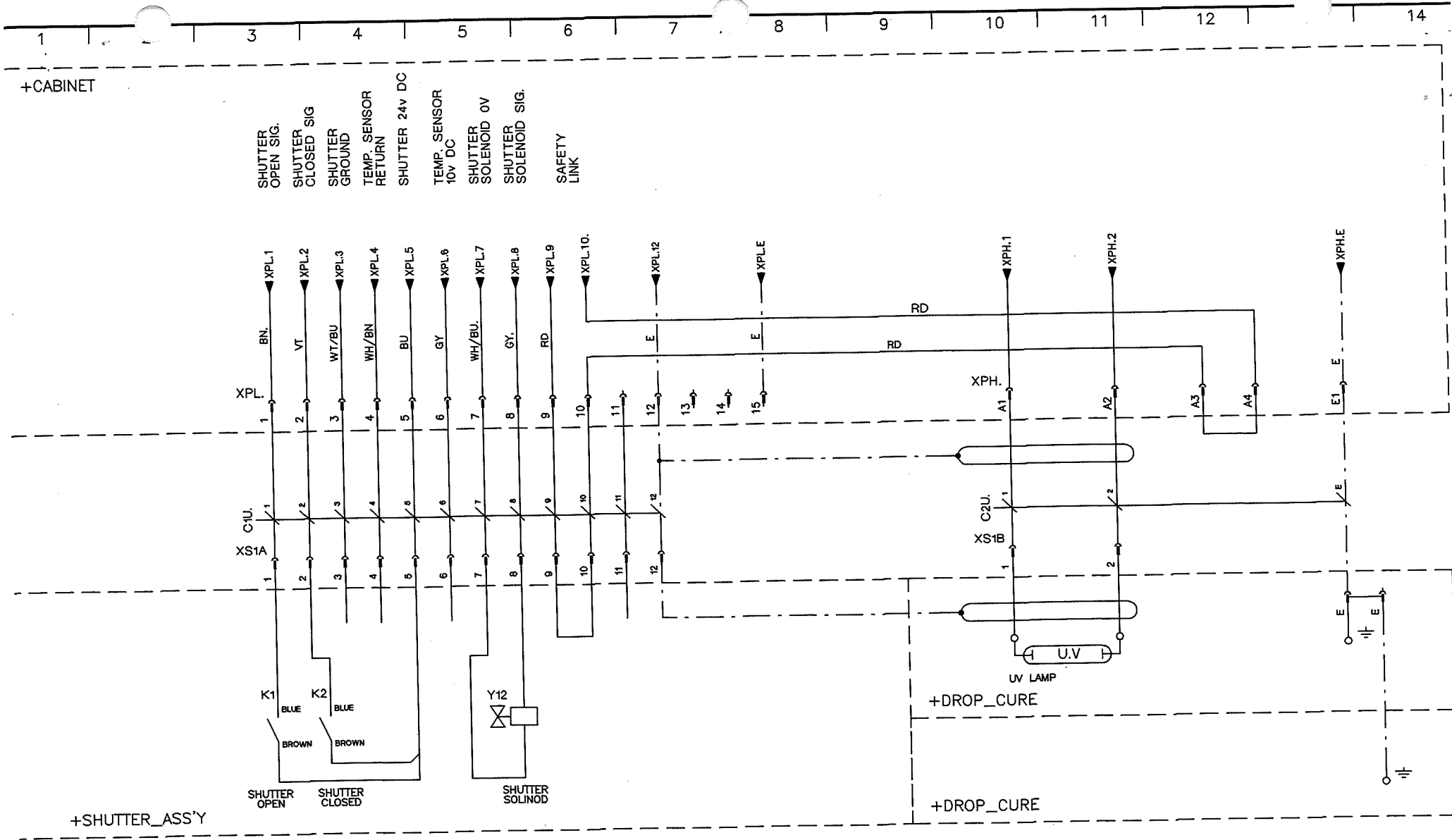
DRWG. MODS. REFORM INDEX AFTER MODS.

F) HT SAFETY LINK ADDED

3KW W'COOLED SYSTEM
CABINET
TINY CURE LAMP HEAD OPTION

J6360A-3

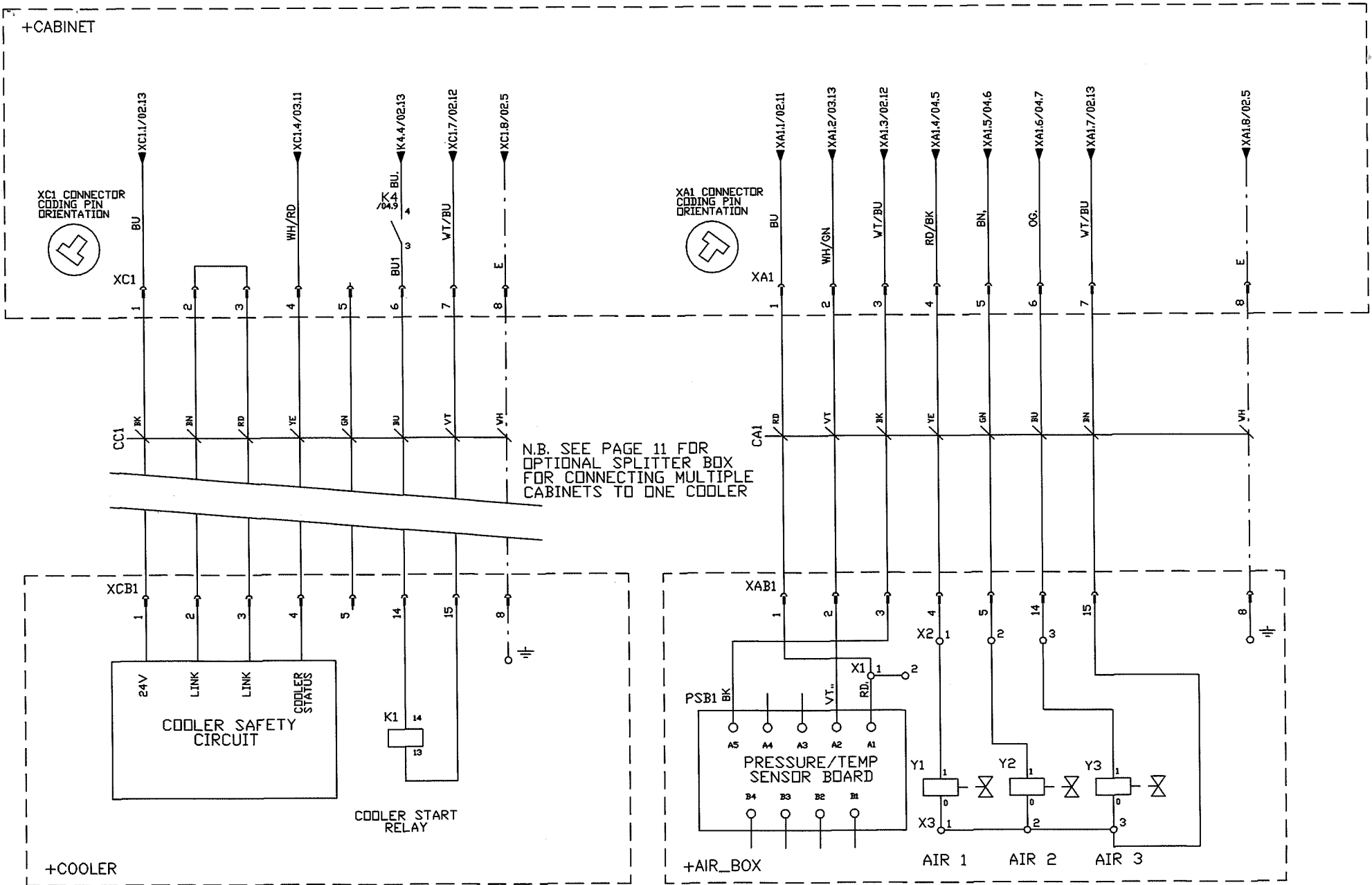
DRG.No.	LATEST ISSU
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+CABINET

+SHUTTER_ASS'Y

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	A	MCS	08.02.08	<input type="checkbox"/> HT SCREEN ADDED <input type="checkbox"/> FT HT SAFETY LINK ADDED		J6360A-3	08 F
	F	MCS	02.06.08			7352063	SHEET 08 OF 12



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ISSUE	D/MAN	DATE
A	MCS	08.02.08
F	MCS	02.06.08

DRWG. MODS. REFORM INDEX AFTER MODS.

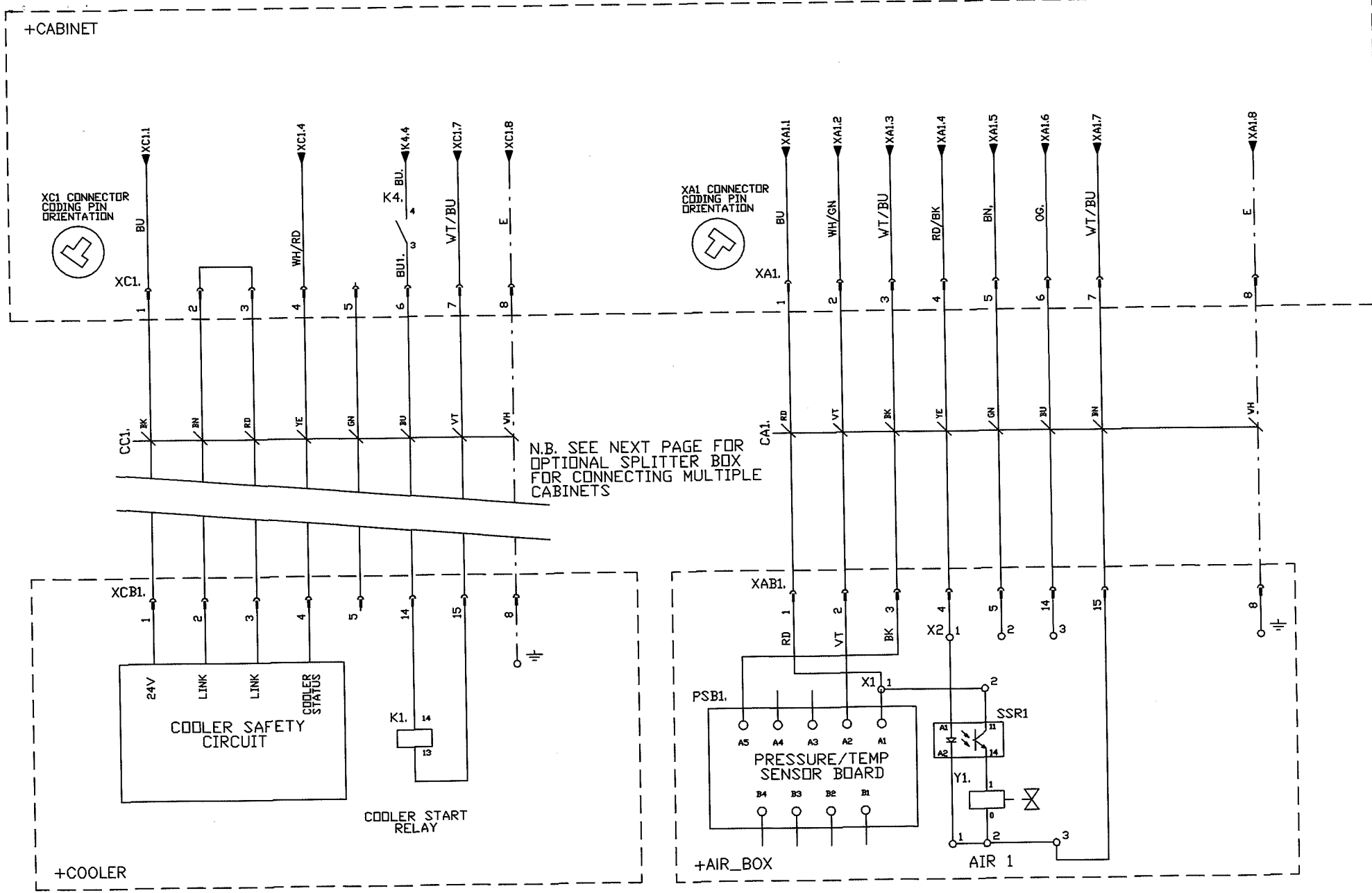
CODING PIN REFERENCE ADDED
Terminals added to Air-Box

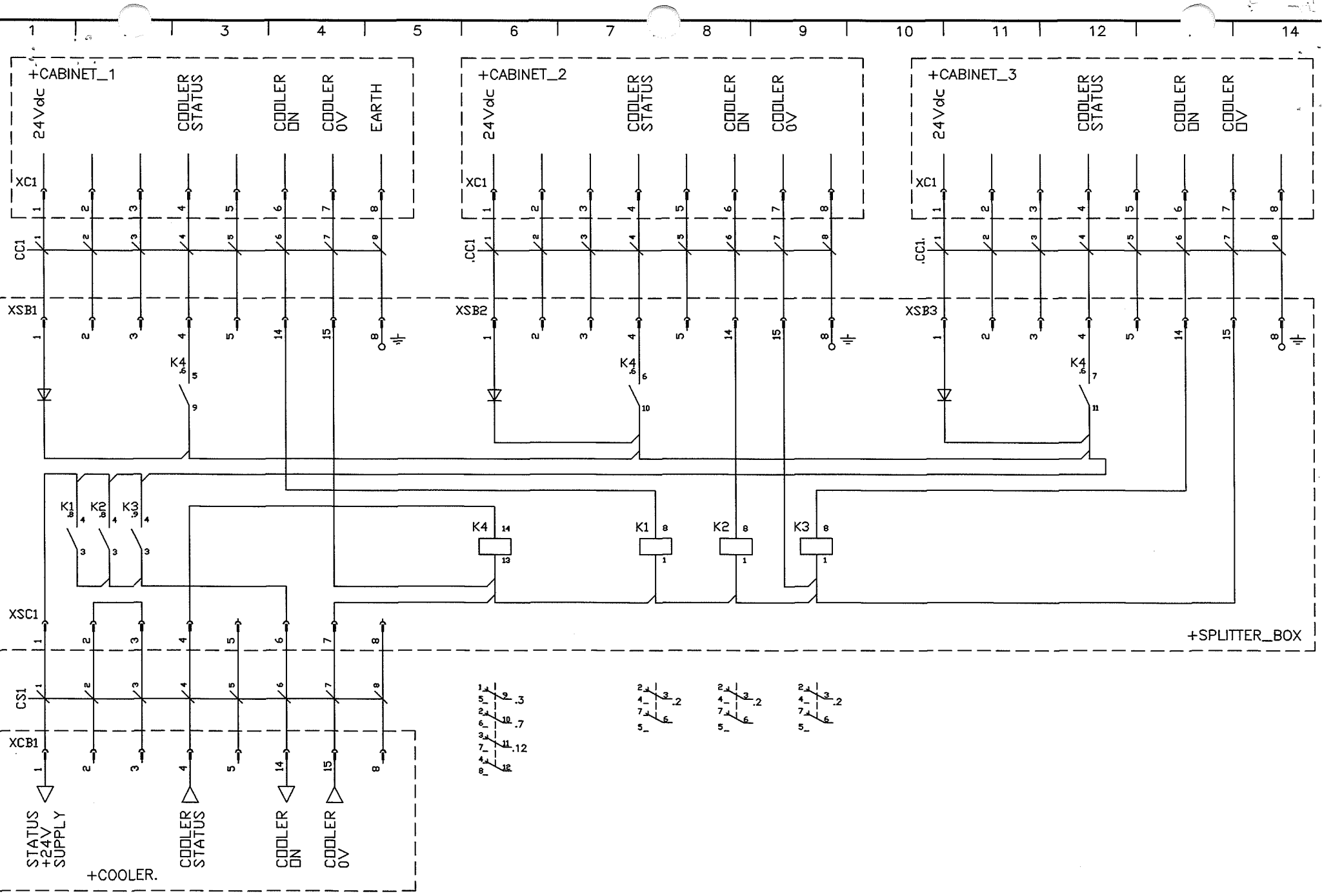
3KW W'COOLED SYSTEM
CABINET
COOLER AND AIRBOX (OPTION 1)

J6360A-3

DRG.No. 7352063 LATEST ISSUE 09 F

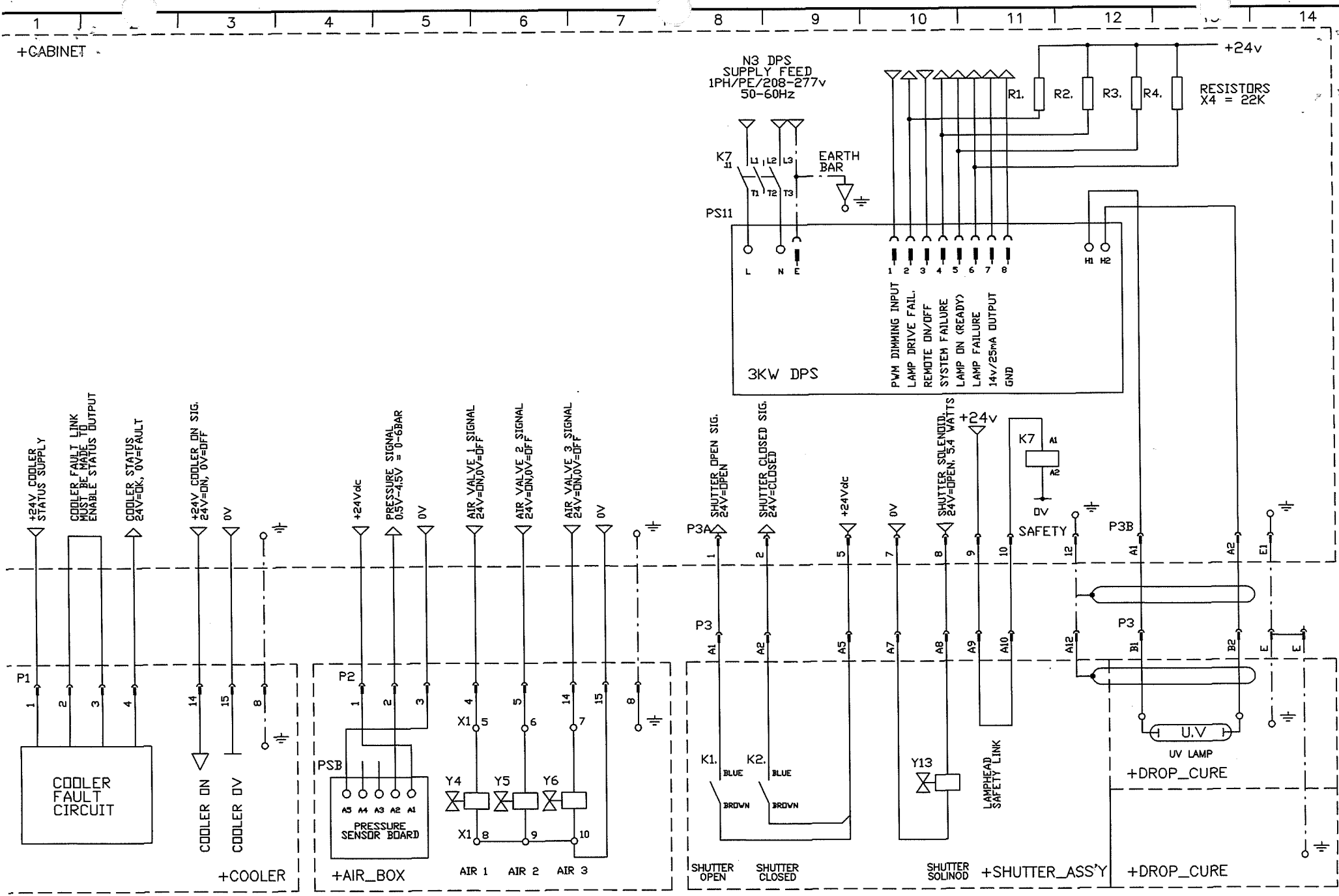
SHEET 09 OF 12





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	<small>04.09.08</small>	<small>COPYRIGHT</small> COPY ©	<small>F</small> MCS	<small>DATE</small> 02.06.08	<small>DRWG. MODS.</small> SPLITTER_BOX REWIRED FOR INDIVIDUAL CABINET COOLER CONTROL	SPLITTER_BOX OPTION	SHEET 11 OF 12					

N/A

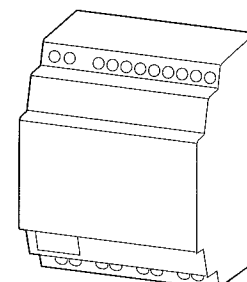
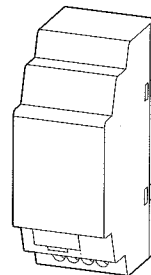
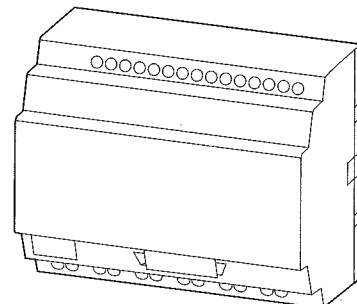
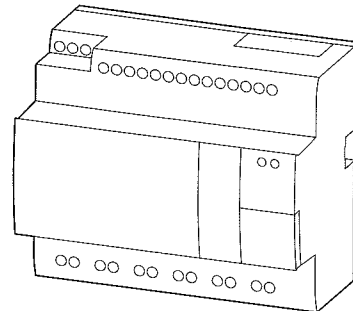
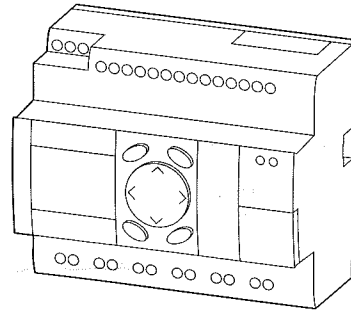


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	3KW W'COOLED SYSTEM CABINET J6360A-3 3KW DROPCURE SYSTEM CONNECTIONS											

11/10 IL05013012Z
(AWA2528-1979)

easyRelay

EASY819-..., EASY820-...
EASY821-..., EASY822-...
EASY618-...-E, EASY620-...-E
EASY200-EASY, EASY202-RE
EASY410-DC-...



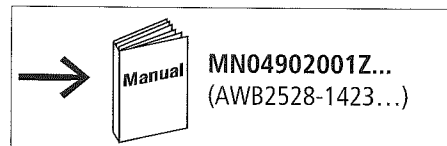
(en) Electric current! Danger to life!
Only skilled or instructed persons may carry out the following operations. The national regulations/specifications must be observed for the installation of the devices.

(de) Lebensgefahr durch elektrischen Strom!
Nur Elektrofachkräfte und elektrotechnisch unterwiesene Personen dürfen die im Folgenden beschriebenen Arbeiten ausführen. Die Stromversorgungsgeräte sind Einbaugeräte. Beachten Sie für die Installation der Geräte die länderspezifischen Vorschriften.

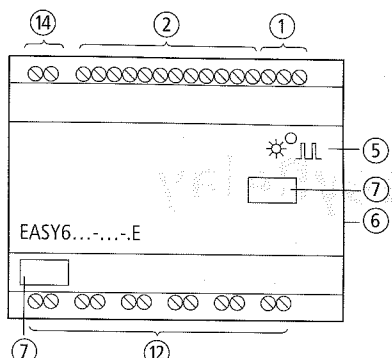
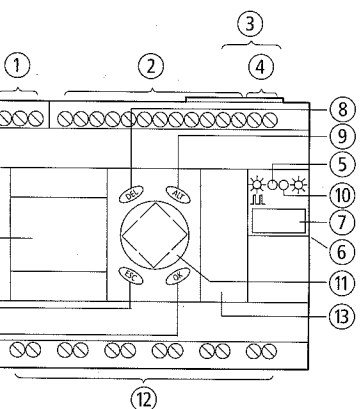
(fr) Tension électrique dangereuse !
Seules les personnes qualifiées et averties doivent exécuter les travaux ci-après. Les blocs d'alimentation sont des appareils faisant partie intégrante d'une installation. Veuillez respecter les normes de mise en œuvre spécifiques aux différents pays.

(es) ¡Corriente eléctrica! ¡Peligro de muerte!
El trabajo a continuación descrito debe ser realizado por personas calificadas y advertidas. Las fuentes de alimentación son aparatos de montaje. Para la instalación de los aparatos han de tenerse en cuenta las normativas/especificaciones a nivel local.

(it) Tensione elettrica: Pericolo di morte!
Solo persone abilitate e qualificate possono eseguire le operazioni di seguito riportate. Gli alimentatori sono unità per montaggio interno. Per l'installazione degli apparecchi è necessario rispettare le normative specifiche di ciascun paese.



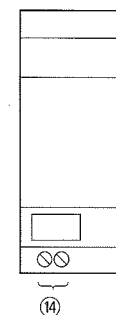
view – Frontansicht – Face avan – Vista de frenet – Vista frontale



Power supply
 EASY8...-DC... 24 V DC
 EASY8...-AC... 85 to 264 V AC 50/60 Hz
 Inputs
 EASY8...-DC... 12 inputs 24 V DC (4 can also be used as 0 to 10 V DC/10 Bit analog inputs)
 EASY8...-AC... 12 inputs 0 to 264 V AC
 Network connection NET
 EASY820-DC..., EASY822-DC...
 Analog output 0 to 10 V DC/10 bits
 Power/RUN LED
 Central connection (easyLink)
 Space for component label
 DEL button
 Delete contacts/relays/connections/
 Empty current path/value
 ALT button
 Draw connection
 Toggle between make or break contact
 Invert current path, Special functions
 Network NET-LED
 Cursor buttons: right, left, up, down
 Select contacts, relays, value, numbers
 Button on: Input P1 -> Cursor left
 Input P2 -> Cursor up
 Input P3 -> Cursor right
 Input P4 -> Cursor down
 Outputs
 EASY8...-RC. 6 x relay/EASY6...RE
 EASY8...-DC-TC. 8 x transistor/EASY6...TE
 Interface (with cover), Slot for memory card, battery,
 PC interface, modem interface
 Remote connection
 OK button
 Enter menu, action, accept value
 ESC button
 Return menu back
 End menu, selection, end
 LCD display (where present)

- de
- 1 Spannungsversorgung
 EASY8...-DC... 24 V DC
 EASY8...-AC... 85 bis 264 V AC 50/60 Hz
 - 2 Eingänge
 EASY8...-DC... 12 Eingänge 24 V DC (4 auch als Analog-Eingänge 0 bis 10 V DC/10 Bit nutzbar)
 EASY8...-AC... 12 Eingänge 0 bis 264 V AC
 - 3 Netzwerkanschluss NET
 - 4 EASY820-DC..., EASY822-DC...
 Analog-Ausgang 0 bis 10 V DC/10 Bit
 - 5 Power/RUN-LED
 - 6 Zentrale Kopplung (easyLink)
 - 7 Platz Gerätezeichnungsetikett
 - 8 DEL-Taste
 Löschen von Kontakten/Relais/
 Verbindungen/leerem Strompfad/Wert
 - 9 ALT-Taste
 Verbindungen zeichnen
 Umschalter: Kontakt = Schließer oder Öffner
 Insertion de branches de circuit
 Sonderfunktionen
 - 10 Netzwerk NET-LED
 - 11 Cursortasten: rechts, links, oben, unten
 Kontakte, Relais, Wert, Nummer wählen
 P-Taste an: Eingang P1 = Cursor links
 Eingang P2 = Cursor oben
 Eingang P3 = Cursor rechts
 Eingang P4 = Cursor unten
 - 12 Ausgänge
 EASY8...-RC. 6 x Relais/EASY6...RE
 EASY8...-DC-TC. 8 x Transistor/EASY6...TE
 - 13 Schnittstelle (mit Abdeckung),
 Steckplatz für Speicherkarte, Batterie,
 PC-Schnittstelle, Modemschnittstelle
 - 14 Dezentrale Kopplung
 - 15 OK-Taste
 Menü weiterschalten, Aktion,
 Wert übernehmen
 - 16 ESC-Taste: Ein Menü zurück
 Menü, Auswahl verlassen, Abbrechen
 - 17 LCD Anzeige (falls vorhanden)

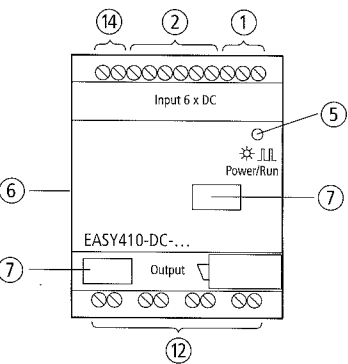
11/10 IL0501301ZZ



- fr
- 1 Alimentation
 EASY8...-DC... 24 V CC
 EASY8...-AC... 85 à 264 V CA 50/60 Hz
 - 2 Entrées
 EASY8...-DC... 12 entrées 24 V CC (dont 4 utilisables comme entrées analogiques 0 à 10 V CC/10 bits)
 EASY8...-AC... 12 entrées 0 à 264 V CA
 - 3 Connecteurs pour mise en réseau (NET)
 - 4 EASY820-DC..., EASY822-DC...
 sortie analogique 0 à 10 V CC/10 bits
 - 5 Tension d'alimentation/DEL RUN
 - 6 Couplage centralisé (easyLink)
 - 7 Emplacement pour étiquette de repérage de l'appareil
 - 8 Touche DEL
 Effacement des contacts/relais/liaisons/
 branches de circuit vierges/valeurs
 - 9 Touche ALT
 Dessiner les liaisons
 Passage d'un contact F à un contact O (ou inversement)
 Insertion de branches de circuit
 Fonctions spéciales
 - 10 Réseau/DEL NET
 - 11 Touches de direction : droite, gauche, haut, bas
 Sélection des contacts, relais, valeurs et numéros
 Affectation des touches P :
 entrée P1 -> flèche « gauche »
 entrée P2 -> flèche « haut »
 entrée P3 -> flèche « droite »
 entrée P4 -> flèche « bas »
 - 12 Sorties
 EASY8...-RC. 6 x relais/EASY6...RE
 EASY8...-DC-TC. 8 x transistor/EASY6...TE
 - 13 Interface (avec capot)
 Emplacement pour carte mémoire, batterie, interface
 PC, interface modem
 - 14 Couplage décentralisé
 - 15 Touche OK
 Validation des menus, des actions et des valeurs
 - 16 Touche ESC
 Retour au menu précédent
 Quitter le menu/la sélection, annuler
 - 17 Afficheur à cristaux liquides (si existant)

11/10 IL0501301ZZ

- es
- 1 Tensión de alimentación
 EASY8...-DC... 24 V DC
 EASY8...-AC... 85 hasta 264 V AC 50/60 Hz
 - 2 Entradas
 EASY8...-DC... 12 entradas 24 V DC
 (4 también pueden utilizarse como entradas analógicas de 0 hasta 10 V DC/10 bits)
 EASY8...-AC... 12 entradas 0 hasta 264 V AC
 - 3 Conexión de red NET
 - 4 EASY820-DC..., EASY822-DC...
 salida analógica 0 hasta 10 V DC/10 bits
 - 5 Cierre/LED de funcionamiento
 - 6 Acoplamiento centralizado (easyLink)
 - 7 Espacio para la etiqueta con el símbolo del aparato
 - 8 Tecla DEL
 Borrar contactos/relés/conexiones/
 circuito de corriente en vacío/valor
 - 9 Tecla ALT
 Diseñar conexiones
 Accionamiento del interruptor basculante (toggle)
 entre contacto de apertura o de cierre
 Insertar circuito de corriente
 Funciones especiales
 - 10 Red NET-LED
 - 11 Teclas de cursor: derecha, izquierda, arriba, abajo.
 Selección de contactos, relés, valor, números
 Tecla P sobre: Entrada P1 -> Cursor izquierda
 Entrada P2 -> Cursor arriba
 Entrada P3 -> Cursor derecha
 Entrada P4 -> Cursor abajo
 - 12 Salidas
 EASY8...-RC. 6 x relés/EASY6...RE
 EASY8...-DC-TC. 8 x transistor/EASY6...TE
 - 13 Interface (con tapa)
 Slot para tarjeta de memoria, batería, interface PC,
 interface modem
 - 14 Acoplamiento descentralizado
 - 15 Tecla OK
 Entrar menú, acción, aceptar valor
 - 16 Tecla ESC
 Un menú hacia atrás
 Menú, abandonar selección, cancelar
 - 17 Indicador LCD (si existe)

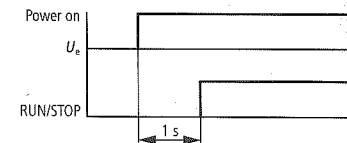
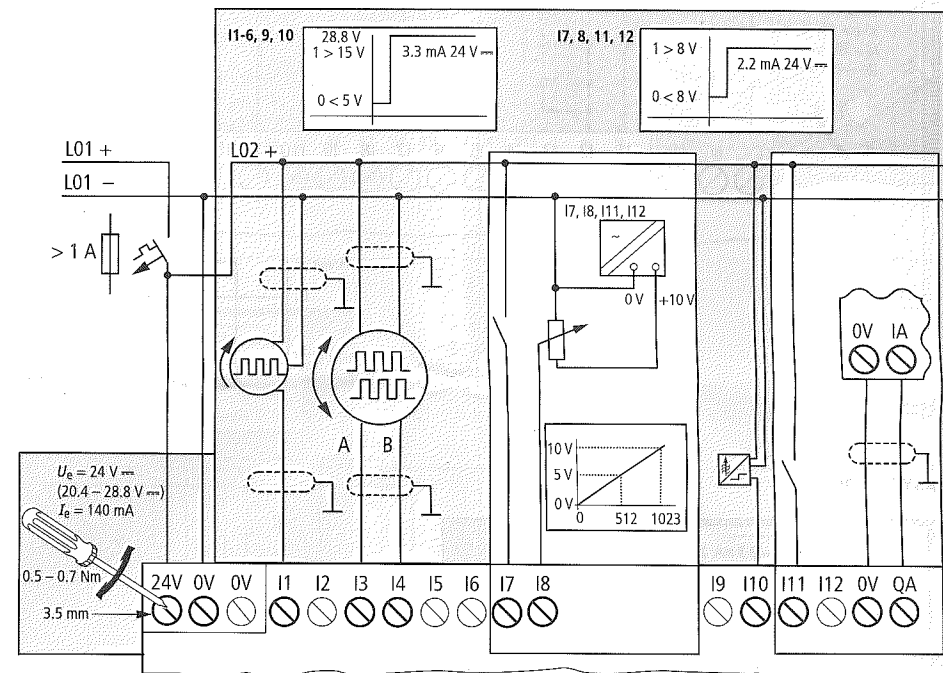


Tensione di alimentazione
 EASY8...-DC-... 24 V DC
 EASY8...-AC-... 85 a 264 V AC 50/60 HZ
 Ingressi
 EASY8...-DC-... 12 ingressi 24 V DC (4 utilizzabili anche come ingressi analogici 0 a 10 V DC/10 bits)
 EASY8...-AC-... 12 ingressi 0 a 264 V AC
 Collegamento di rete NET
 EASY820-DC-..., EASY822-DC-...
 uscita analogica da 0 a 10 V DC/10 bit
 LED Power/RUN
 Collegamento locale (easyLink)
 Spazio etichetta di identificazione dell'apparecchio
 Tasto DEL
 Cancellazione di contatti, relè, linee vuote, valore
 Tasto ALT
 Disegno dei collegamenti
 Commutatore: contatto = chiusura/apertura
 Inserisci circuito
 Funzioni speciali

- ⑩ Rete NET-LED
- ⑪ Tasti cursore, destra, sinistra, su, giù
 Selezione contatti, relè, valore, numeri
 Tasto P su: lato P1 -> cursore a sinistra
 lato P2 -> cursore su
 lato P3 -> cursore a destra
 lato P4 -> cursore giù
- ⑫ Uscite
 EASY8...-...-RC. 6 x relè/EASY6...RE
 EASY8...-DC-TC. 8 x transistor/EASY6...TE
- ⑬ Interfaccia (con copertura)
 Posizione di inserimento per la scheda di memoria, batteria, slot PC, slot per modem
- ⑭ Collegamento remoto
- ⑮ Tasto OK
 Menu successivo, azione, acquisizione dati
- ⑯ Tasto ESC
 Menu precedente
 Menu, abbandonare scelta, interrompere
- ⑰ Visualizzatore LCD (se previsto)

11/10 IL0501301ZZ

11/10 IL0501301ZZ



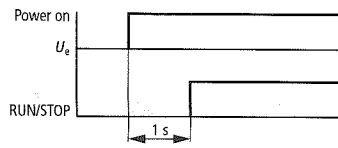
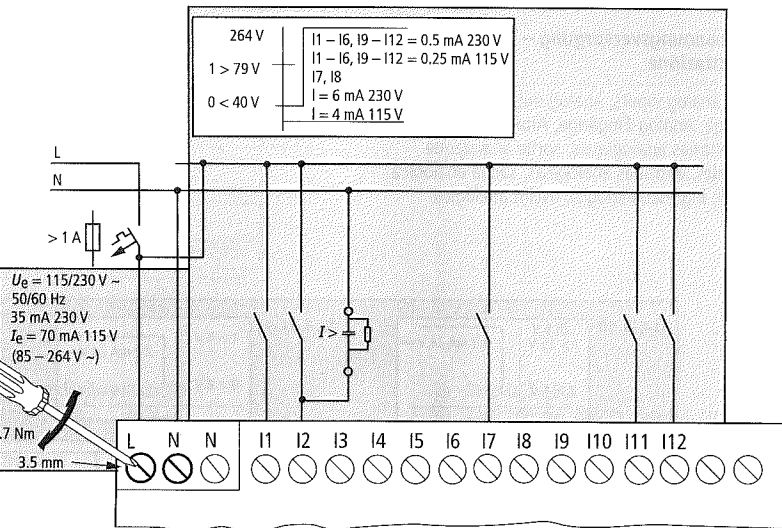
Standard connection – Standardanschluss – Raccordement standard – Conexión estándar – Collegamento standard

Power supply – Spannungsversorgung – Tension d'alimentation – Tensión de alimentación – Tensione di alimentazione

- en Digital inputs, analog inputs, analog output
- de Digital-Eingänge, Analog-Eingänge, Analog-Ausgang
- fr Entrées TOR, entrées analogiques, sortie analogique
- es Entradas digitales, entradas analógicas, salida analógica
- it Ingressi digitali, ingressi analogici, uscita analogica

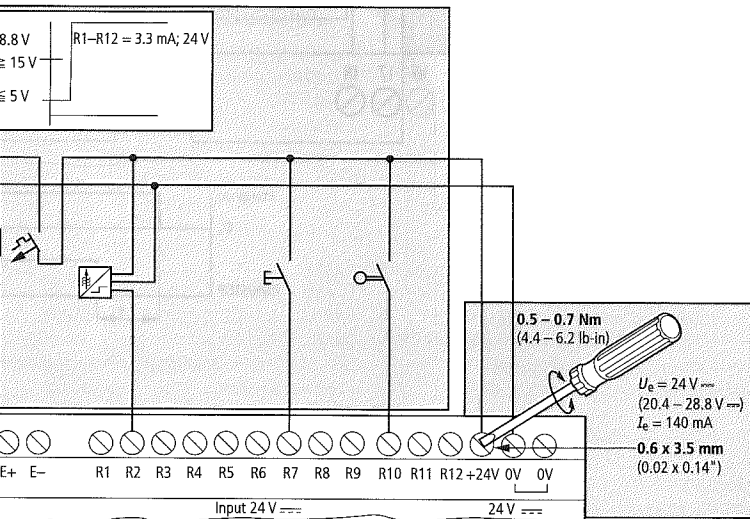
EASY8...-DC-...

...-AC...

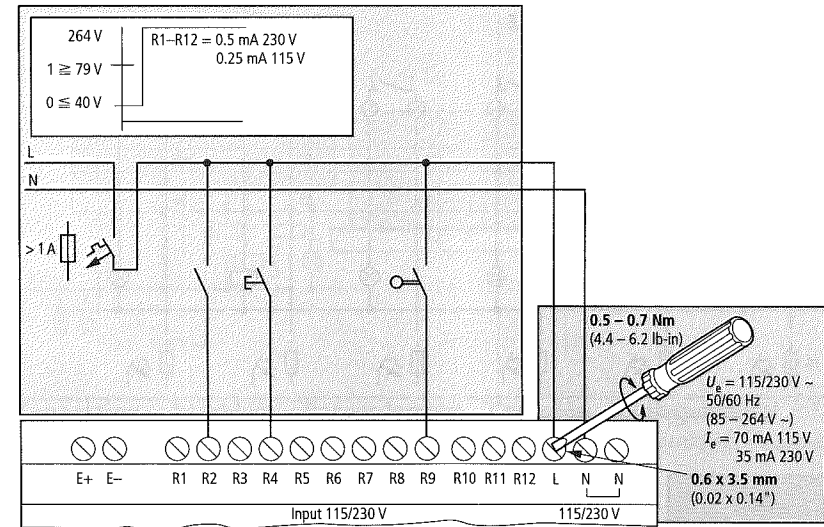


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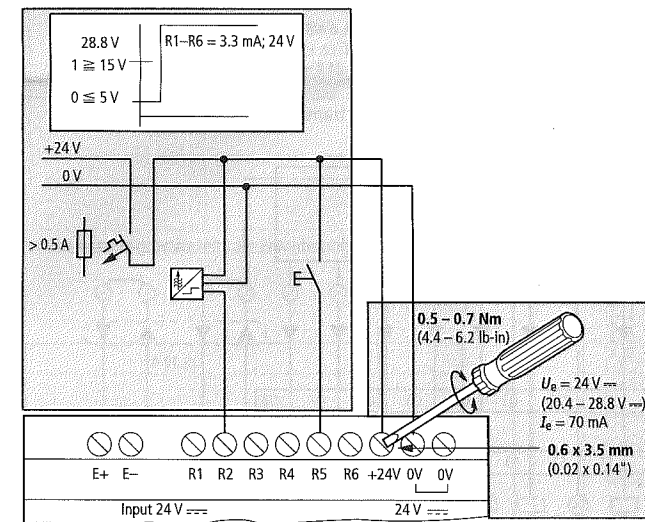
...-DC-E



EASY6...-AC-E



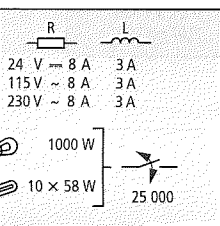
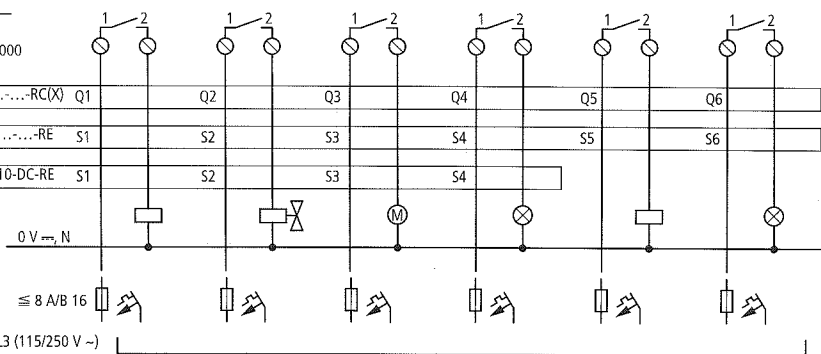
EASY410-DC...



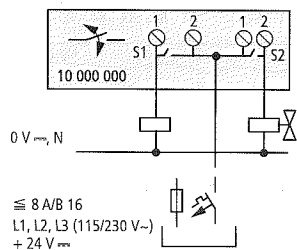
11/10 IL05013012Z

Outputs – Relais-Ausgänge – Sorties à relais – Salidas con relé – Uscite a relè

.....RC-, EASY6.....RE, EASY410-DC-RE

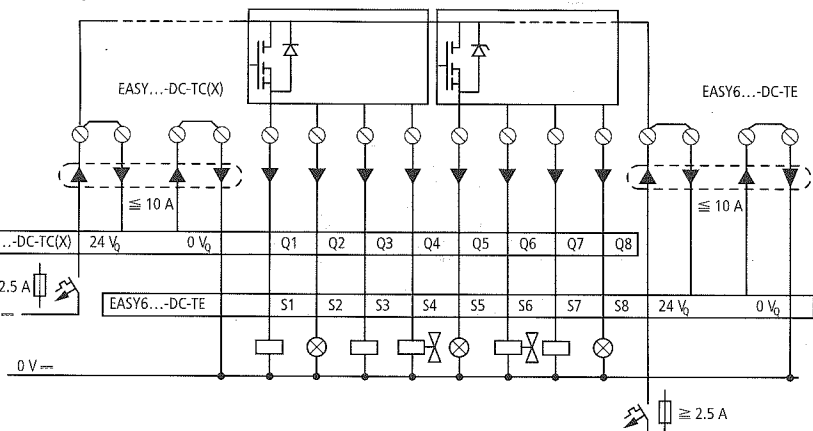


EASY202-RE

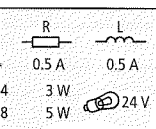


Transistor outputs – Transistor-Ausgänge – Sorties à transistors – Salidas de transistor – Uscite a transistor

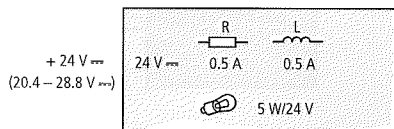
.....DC-TC, EASY6....DC-TE



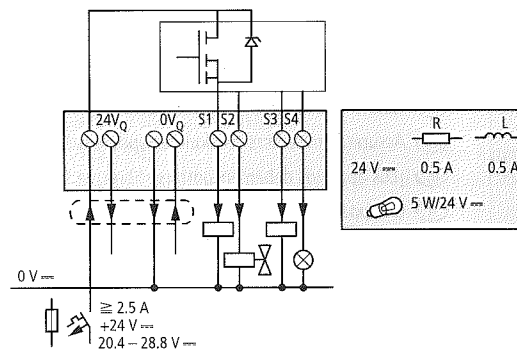
.....DC-...



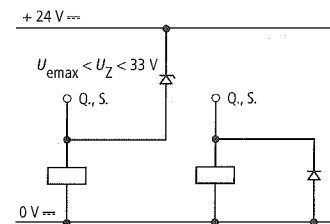
EASY6....DC-...



EASY410-DC-TE



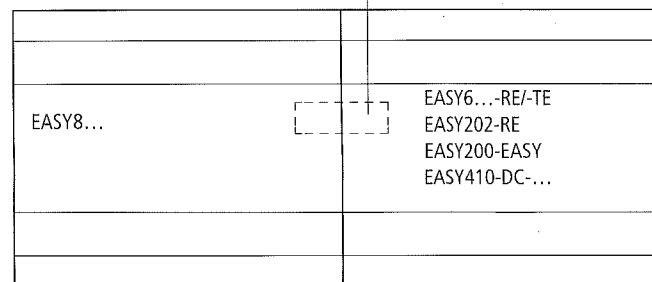
Protective circuit – Schutzbeschaltung – Circuit de protection – Circuito supresor – Circuito di protezione



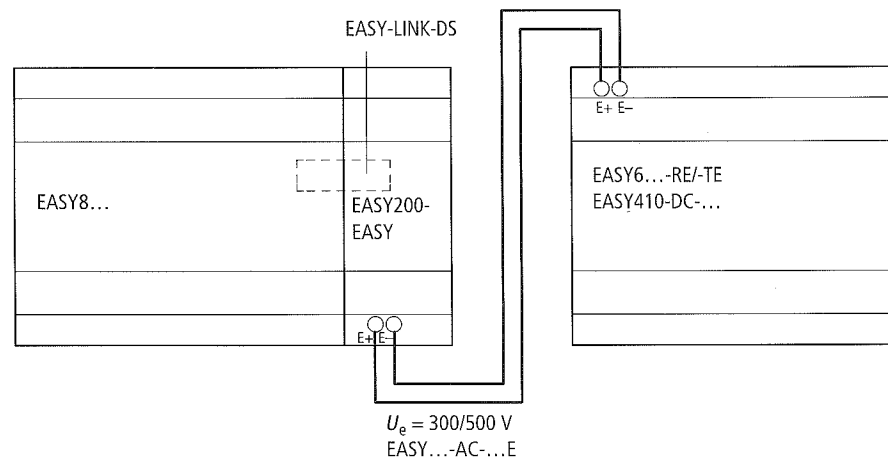
Connection – Anschluss – Raccordement – Conexión – Collegamento

Central expansion – Zentrale Erweiterung – Extension centralisée – Ampliación centralizada – Espansione locale

EASY-LINK-DS



Remote expansion – Dezentrale Erweiterung – Extension décentralisée – Ampliación descentralizada – Espansione remota



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**Local expansion – Zentrale Erweiterung – Extension centralisée –
Expansión centralizada – Espansione locale**

Mounting 1 + 2, removing 3 + 4

Aufbau 1 + 2, Ausbau 3 + 4

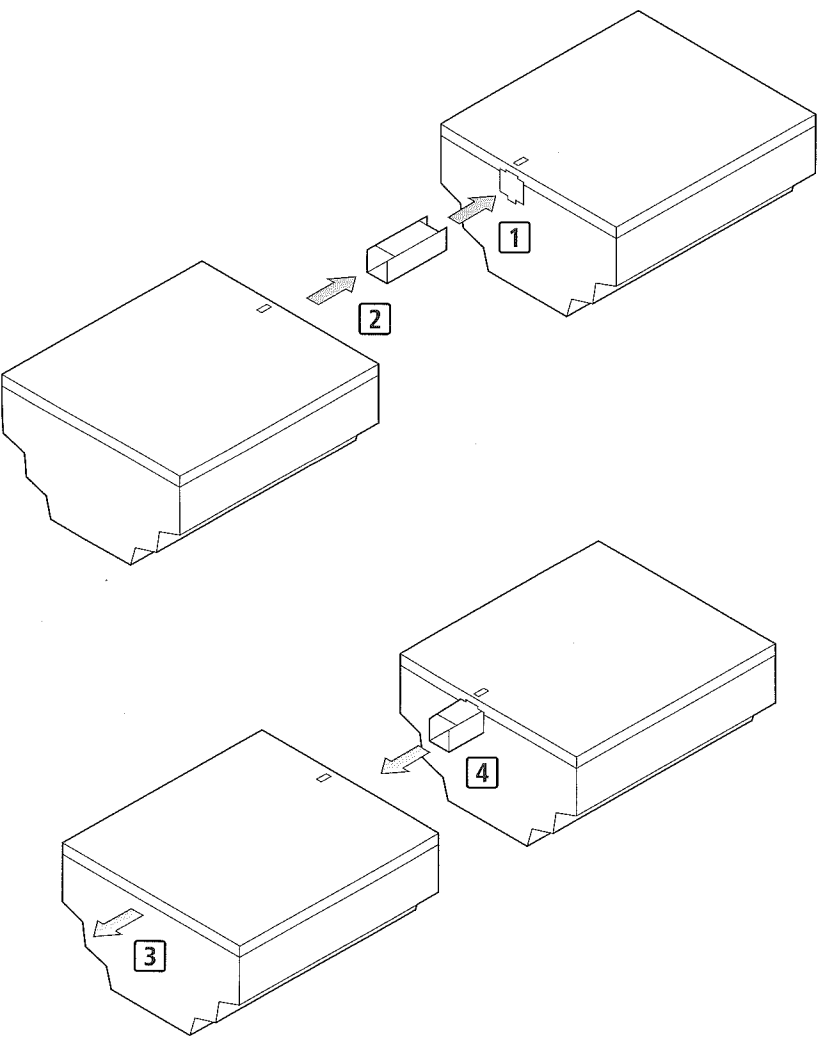
Montage 1 + 2, démontage 3 + 4

Montaje 1 + 2, desmontaje 3 + 4

Montaggio 1 + 2, smontaggio 3 + 4



- (en) Devices must be de-energized!
- (de) Geräte müssen spannungsfrei sein!
- (fr) Assurer la mise hors tension des appareils !
- (es) ¡Los aparatos deben encontrarse libres de tensión!
- (it) Gli apparecchi non devono essere alimentati!



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(en) **Temperature range:**

(de) **Temperaturbereich:**

(fr) **Plage de température :**

(es) **Margen de temperatura:**

(it) **Campo temperatura:**

-25...+55 °C

-13...+131 °F

- (en) – LCD display legible in range 0 to 55 °C (32 °F to 131 °F)
- On no account allow condensation to form on the device!

- (de) – LCD-Anzeige im Bereich 0 bis 55 °C (32 °F bis 131 °F) lesbar
- Betauung des Gerätes unbedingt verhindern!

- (fr) – Afficheur à cristaux liquides lisible dans la plage 0 à 55 °C (32 °F à 131 °F)
- Éviter impérativement toute condensation sur l'appareil !

- (es) – El visualizador LCD puede leerse dentro de un margen entre 0 – 55 °C (32 °F – 131 °F)
- ¡Evitar que se produzca condensación en el aparato!

- (it) – Visualizzatore LCD leggibile ad una temperatura compresa da 0 a 55 °C (32 °F a 131 °F)
- Impedire assolutamente la formazione di condensa sull'apparecchio!

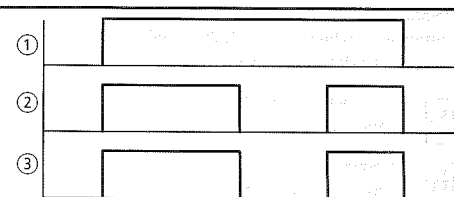
(en) **Short-circuit detection**

(de) **Kurzschlussauswertung**

(fr) **Analyse du court-circuit**

(es) **Detección de cortocircuitos**

(it) **Segnale di cortocircuito**



- (en) ① Power supply of the outputs
- (de) ① Spannungsversorgung der Ausgänge
- (fr) ① Alimentation en tension des sorties
- (es) ① Alimentación de tensión de las salidas
- (it) ① Tensione di alimentazione delle uscite

- (en) ② Short-circuit, overload, overtemperature
- (de) ② Kurzschluss, Überlast, Übertemperatur
- (fr) ② Court-circuit, surcharge, échauffement
- (es) ② Cortocircuito, sobrecarga, sobretemperatura
- (it) ② Cortocircuito, sovraccarico, sovratemperatura

- (en) ③ Fault detection
- (de) ③ Fehlererkennung
- (fr) ③ Détection de défauts
- (es) ③ Detección de fallos
- (it) ③ Riconoscimento errori

I16 = Q1–Q4
I15 = Q5–Q8
R16 = S1–S4
R15 = S5–S8

(en) **I14 expansion monitoring**

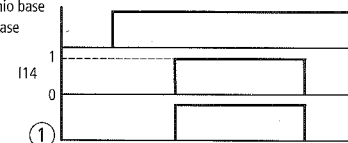
(de) **Erweiterungsüberwachung I14**

(fr) **Surveillance module d'extension I14**

(es) **Control módulo de ampliación I14**

(it) **Monitoraggio modulo d'espansione I14**

Basisgerät – Basic unit
Appareil de base
Apparecchio base
Aparato base



- (en) ① EASY-LINK faulty, cable break
- (de) ① EASY-LINK gestört, Kabelbruch
- (fr) ① Défaut EASY-LINK, rupture de câble
- (es) ① EASY-LINK erróneo, rotura de cable
- (it) ① EASY-LINK disturbato, rottura cavo

EASY800-PC-CAB interface
 Schnittstelle EASY800-PC-CAB
 Interface EASY800-PC-CAB
 Interface EASY800-PC-CAB
 Interfaccia EASY800-PC-CAB

EASY-M-256K memory card
 Speichermodul EASY-M-256K
 Carte mémoire EASY-M-256K
 Tarjeta de memoria EASY-M-256K
 Scheda di memoria EASY-M-256K

Remove sealing cap – Verschlusskappe
 entfernen – Retirer cache – Quitar tapón –
 Rimuovere calotta di chiusura

2b fit – stecken – enficher –
 meter – inserire

3b remove – entfernen –
 retirer – quitar – rimuovere

Fit sealing cap – Verschlusskappe stecken –
 Einficher cache – Meter tapón –
 Inserire calotta di chiusura

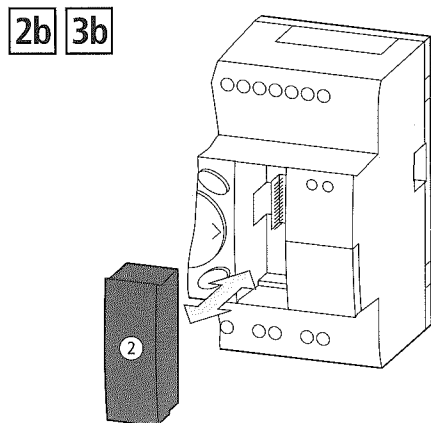
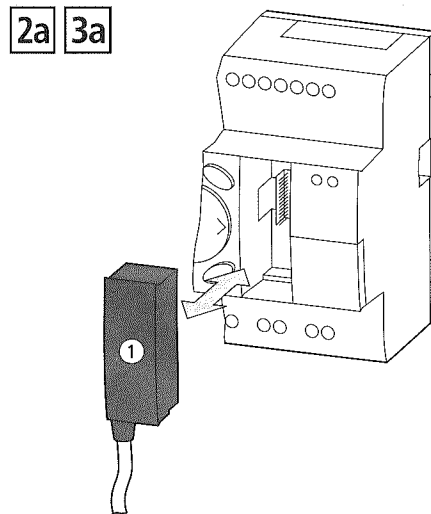
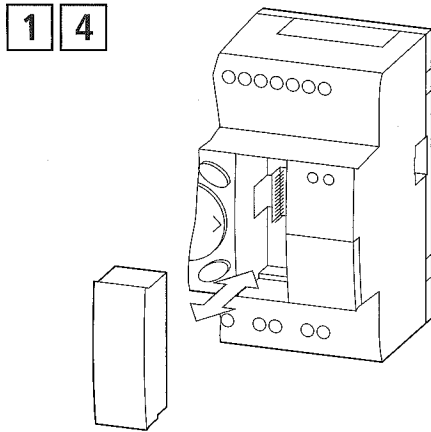
(en) Warning!
 The interface must be kept closed.
 Electrostatic discharges may destroy the
 device if the interface is open.

Warnung!
 Die Schnittstelle ist geschlossen zu halten.
 Statische Entladungen können bei geöffnetem
 Gehäuse die Geräte zerstören.

Attention !
 Aucun connecteur n'est enfiché dans
 l'appareil, cette dernière doit impérativement être
 fermée à l'aide du capot prévu à cet effet (fourni avec
 l'appareil). Dans le cas contraire, des décharges
 électrostatiques risquent d'endommager gravement
 l'appareil et de le rendre inutilisable.

Avvertencia!
 La interfaz debe permanecer cerrada.
 En caso contrario, descargas electroestáticas podrían
 destruir el aparato.

Avvertimento!
 L'interfaccia deve restare chiusa. Scariche
 elettrostatiche con interfaccia aperta possono
 distruggere l'apparecchio.



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NET network – Netzwerk NET – Réseau NET – Red NET – Rete NET

Slave address – Teilnehmeradresse – Adresse des participants – Dirección del participante – Indirizzo utente

- (en) Slave number 1 to 8 possible.
- (de) Teilnehmernummer 1 bis 8 möglich.
- (fr) Numéros admissibles pour les participants : 1 à 8.
- (es) Número de participante posible de 1 a 8.
- (it) Numero utenti da 1 a 8.

Setting network parameters – Netzwerkparameter einstellen – Réglage des paramètres réseau –
 Ajustar parámetros de red – Impostazione parametri rete

CONFIGURATOR -> NET -> NET-PARAMETER
 KONFIGURATOR -> NET -> NET-PARAMETER
 CONFIGURATEUR -> NET -> PARAM. RESEAU
 CONFIGURADOR -> NET -> PARAM. DE RED
 CONFIGURATORE -> NET -> PARAMETRI RETE

NET-ID	: 1-8
BAUDRATE	: 10, 20, 50, 125, 250, 500, 1000 kBaud
BUSDELAY	: 0-15
SEND ID	:
REMOTE RUN	:
REMOTE ID	:

Create station list – Teilnehmerliste erstellen – Elaboration de la liste des participants –
 Crear lista de participantes – Creazione lista utenti

CONFIGURATOR -> NET -> STATION
 KONFIGURATOR -> NET -> TEILNEHMER
 CONFIGURATEUR -> NET -> PARTICIPANT
 CONFIGURADOR -> NET -> PARTICIPANTE
 CONFIGURATORE -> NET -> UTENTE

Location Platz Position Posición Posizione	Station Teilnehmer Participant Partecipante Utente
1	1
2	0 ¹⁾
3	0 ¹⁾
4	0 ¹⁾
5	0 ¹⁾
6	0 ¹⁾
7	0 ¹⁾
8	0 ¹⁾

1) selectable – wählbar – au choix – seleccionable – selezionabile

**ng stations – Teilnehmer adressieren – Adressage des participants – Dirigir participante –
ento indirizzo utente**

setting parameters
station list where location number does not equal station number

Parameter einstellen
mmerliste erstellen wenn Platz ungleich Teilnehmernummer

Réglage des paramètres
er la liste des participants lorsque la position diffère du numéro de participant

Ajustar parámetros
lista de participantes cuando la posición no corresponda al número de participante

mpostazione parametri
one lista utenti se la posizione fisica è diversa dall'indirizzo logico

URATOR -> NET -> CONFIGURE -> CONFIGURE ?
URATOR -> NET -> KONFIGURIEREN -> KONFIGURIEREN ?
URATEUR -> NET -> CONFIGURER -> CONFIGURER ?
URADOR -> NET -> CONFIGURAR -> CONFIGURAR ?
URATORE -> NET -> CONFIGURARE -> CONFIGURARE ?

button = All devices connected are configured according to Parts List or location.
ste OK = Alle angeschlossenen Geräte werden nach Geräteliste oder Platz konfiguriert.
uche OK = Tous les appareils raccordés seront configurés en fonction de la liste ou de la position.
la OK = Todos los aparatos conectados se configuran según la lista del aparato o la posición.
sto OK = Tutti gli apparecchi collegati vengono configurati a seconda della lista apparecchi o della posizione.

**rate/cable length – Baudrate/Leitungslänge – Vitesse de transmission/longueur des câbles –
ad de transmisión/longitud de cable – Velocità di trasmissione in baud/lunghezza linea**

	l	
	[m]	[ft]
0	≦ 6	≦ 20
	≦ 25	≦ 82
	≦ 40 ¹⁾	≦ 131 ¹⁾
	≦ 125	≦ 410
	≦ 300	≦ 984
	≦ 700	≦ 2297
	≦ 1000	≦ 3280

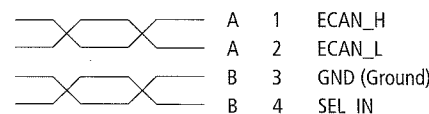
40 m (131 ft),
cross-section – Querschnitt beachten – Respecter la
on – Observar sección – Attenzione alla sezione

**Cable length, resistance and cross-section – Leitungslänge, Widerstand und Querschnitt –
Longueur des câbles, résistivité et sections – Longitud de cable, resistencia y sección –
Lunghezza linea, resistenza e sezione cavo**

l		Cable resistance Leitungswiderstand Résistivité Resistencia de cable Resistenza conduttore	∅	AWG
[m]	[ft]	[mΩ/m]	[mm ²]	
0 – 40	131	≦ 140	0.13	26
0 – 175	574	≦ 70	0.25 – 0.34	23, 22
0 – 250	820	≦ 60	0.34 – 0.6	22, 20, 19
0 – 400	1313	≦ 40	0.5 – 0.6	19, 20
0 – 600	1969	≦ 26	0.75 – 0.8	18
0 – 1000	3280	≦ 16	1.5	16

**Cable type/plug configuration of EASY-NT-RJ45 – Leitungsart/Steckerbelegung EASY-NT-RJ45 –
Type de câble/affectation des connecteurs de EASY-NT-RJ45 – Tipo de cable/asignación de conector
EASY-NT-RJ45 – Tipo di cavo/numero di prese EASY-NT-RJ45**

4 × 0.18 mm², (AWG24)
twisted pair – paarig verdrillt – paire torsadée – trenzado a pares – twistato a coppie



**Plug crimping tool – Quetschwerkzeug Stecker – Outil de sertissage pour connecteurs –
Herramienta de presión, conector – Attrezzo per crimpare il connettore**

EASY-NT-TOOL RJ 45, possible up to 0.4 mm²
RJ 45 bis 0,4 mm² möglich
RJ 45, possible jusqu'à 0,4 mm²
RJ 45, posible hasta 0,4 mm²
RJ 45, possibile fino a 0,4 mm²

**Mains terminating resistor – Netzabschlusswiderstand – Résistance de terminaison de bus –
Resistencia de terminación de red – Resistenza di terminazione della rete**

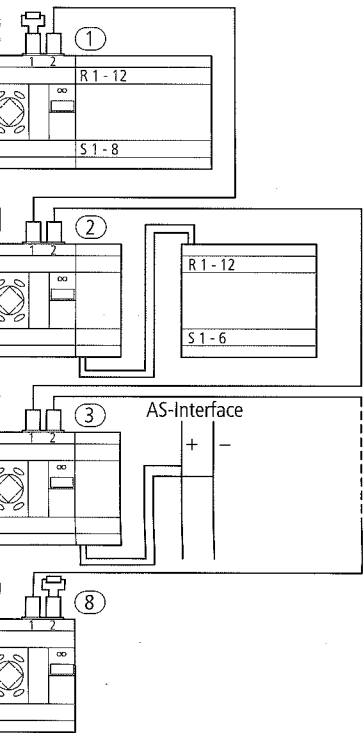
- (en) Erster und letzter Platz mit EASY-NT-R
- (de) First and last location with EASY-NT-R
- (fr) Première et dernière positions avec EASY-NT-R
- (es) Prima ed ultima posizione con EASY-NT-R
- (it) Primera y última posición con EASY-NT-R

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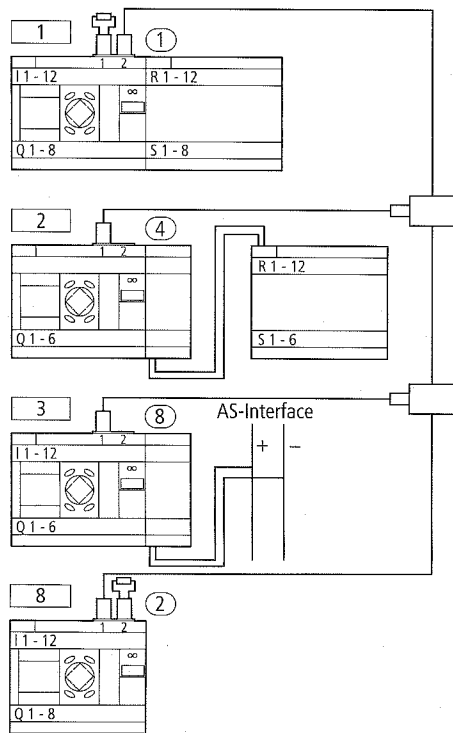
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Network connection looped through the device
 Netzverbindung durch das Gerät geschleift
 Câblage réseau à l'aide du té interne
 Conexión de red rectificada mediante el aparato
 Collegamento di rete attraverso l'apparecchio

Network connection looped through the device
 Netzverbindung durch das Gerät geschleift
 Câblage réseau à l'aide du té interne
 Conexión de red rectificada mediante el aparato
 Collegamento di rete attraverso l'apparecchio



- (en) Network connection with T connector
- (de) Netzverbindung mit T-Stück
- (fr) Câblage réseau à l'aide des té internes
- (es) Conexión de red con pieza T
- (it) Collegamento di rete con adattatore a T

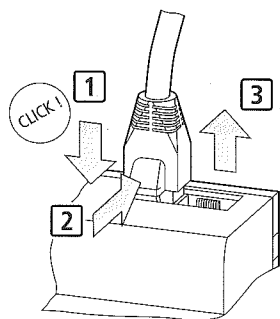


- (en) Geographical location, location
 - (de) Geografischer Ort, Platz
 - (fr) Emplacement physique, position
 - (es) Lugar geográfico, emplazamiento
 - (it) Posizione fisica, posizione utente
- (en) Slave address
 - (de) Teilnehmeradresse
 - (fr) Adresse du participant
 - (es) Dirección de participante
 - (it) Indirizzo utente

connect – verbinden – raccorder –
 conectar – collegare

connect, unlock
 anen, entriegeln
 déverrouiller
 conectar, desenclavar
 sbloccare

connect, remove
 anen, herausziehen
 débrocher
 conectar, extraer
 rimuovere



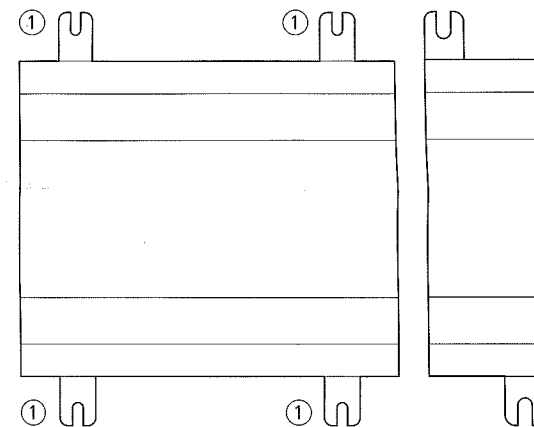
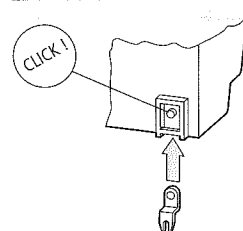
Fitting – Montage – Montaje – Montaggio

- (en) on 35 mm top-hat rail
- (de) auf 35-mm-Hutschiene
- (fr) sur profilé-support 35 mm
- (es) sobre guía simétrica de 35 mm
- (it) su guida DIN 35 mm



- (en) on mounting plate (horizontal)
- (de) auf Montageplatte (waagrecht)
- (fr) sur plaque de montage (horizontal)
- (es) sobre placa de montaje (horizontal)
- (it) su piastra di montaggio (orizzontale)

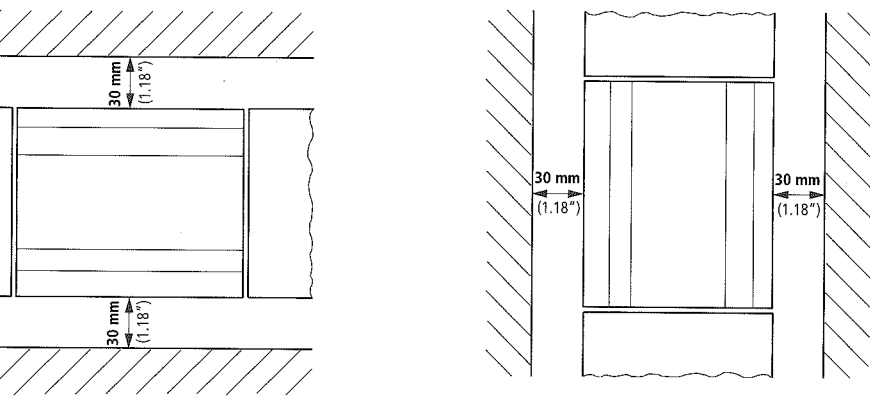
ZB4-101-GF1



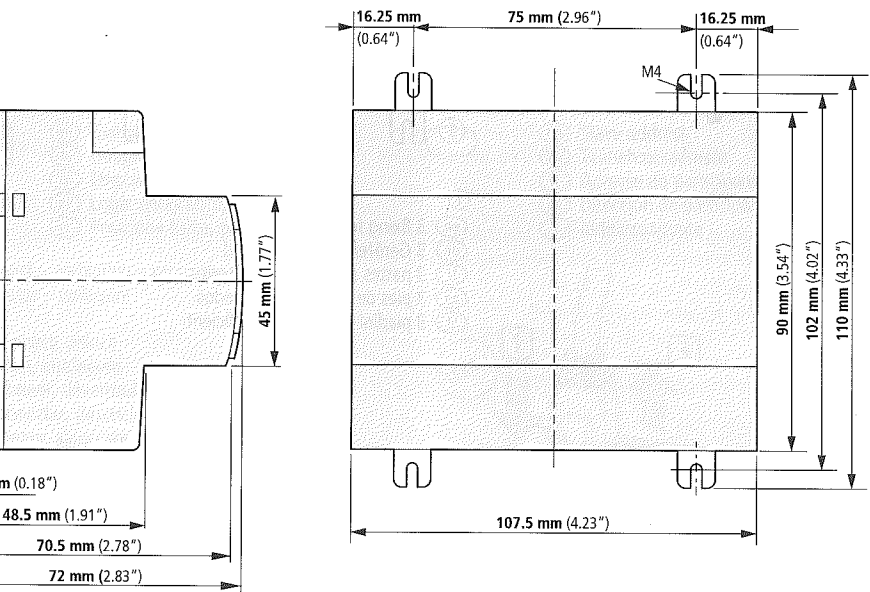
- (en) 3 fixing feet sufficient
- (de) 3 Gerätefüße ausreichend
- (fr) 3 pattes de fixation suffisent
- (es) 3 pies de sujeción adecuados
- (it) 3 piedini di fissaggio sufficienti

Installation position – Einbaulage – Position de montage – Posición de montaje –
 Posizione di montaggio

with top-hat rail (horizontal and vertical)
 mit Hutschiene (waagrecht und senkrecht)
 or profilé chapeau (horizontale et verticale)
 sobre carril (horizontal y vertical)
 guida DIN (orizzontale e verticale)

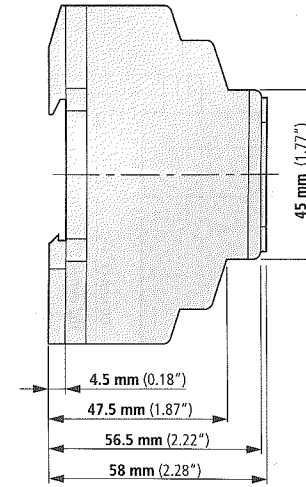


Dimensions – Abmessungen – Dimensiones – Dimensioni [mm, inch]

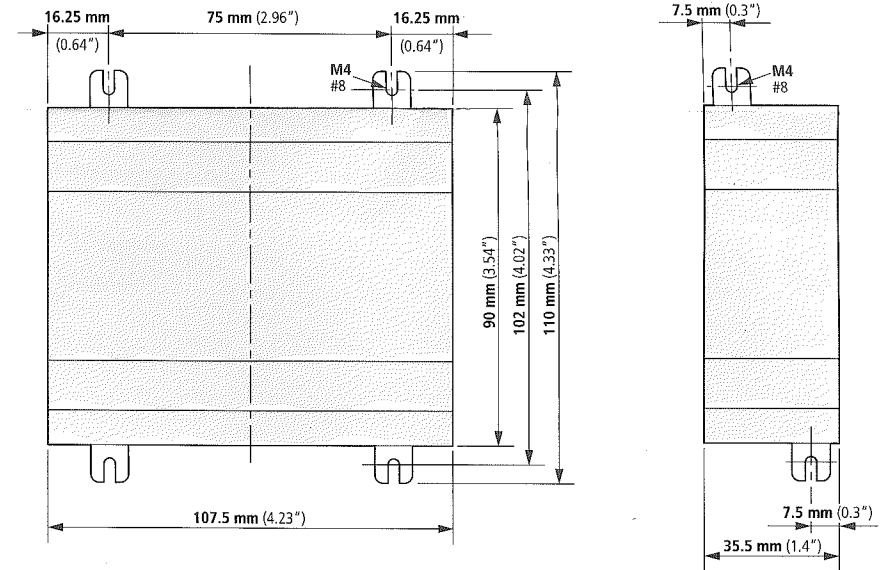


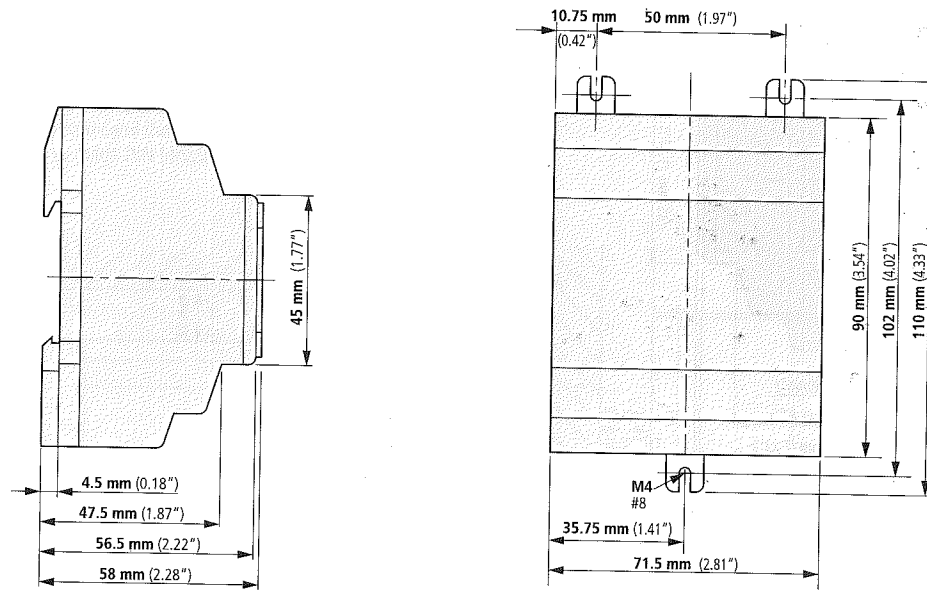
11/10 IL05013012Z

EASY6... , EASY2...



11/10 IL05013012Z





11/10 IL05013012Z

HAZARDOUS LOCATION – CSA (Canadian Standards Association) Certification

This equipment is suitable for use in CLASS I, DIVISION 2, GROUPS A, B, C AND D

WARNING: "EXPLOSION HAZARD – DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS"

EMPLACEMENTS DANGEREUX – Certification CSA (Canadian Standards Association)

Cet équipement est acceptable pour utilisation dans les EEMPLACEMENTS DANGEREUX DE CLASSE I, DIVISION 2, GROUPES A, B, C ET D

AVERTISSEMENT : « RISQUE D'EXPLOSION. NE PAS DÉBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EEMPLACEMENT NON DANGEREUX »

20/20 Emergency On Call Service: Local representative (<http://www.eaton.com/moeller/aftersales>) or +49 (0) 180 5 223822 (de, en)

CH 1 2

WAGNER MODEL R2R-1
S/N H3859

OVENS
SEC 12

AT THE EXIT AREA OF THE MACHINE THERE IS A GAP OF APPROX. 5 FEET THAT HAS BEEN LEFT FOR THE POSSIBLE FUTURE ADDITION OF USER EQUIPMENT AND/OR INSTRUMENTATION.

PRIOR TO ENTERING THE FIRST OF TWO HEATED OVENS, THE FILM IS PLACED ON THE STAINLESS STEEL BELT THAT HAS BEEN DEFLECTED UNDER THE EXTRUDER, THE E-FIELD, THE HEATER PLATES, THE MAGNET AND THE U/V STAGES. THE STEEL BELT IS GUIDED BY A WAGNER INDUSTRIES BELT TRACKER SYSTEM WITH EDGE OVERTRAVEL ALARM CONTACT SENSORS. THE FILM SHOULD POSITION ITSELF APPROXIMATELY CENTER ON THE STEEL BELT AS IT ENTERS THE FIRST OVEN.

THE OVENS ARE IDENTICAL AND ARE DESIGNED TO PROVIDE A TWO STAGE TEMPERATURE ZONE. ELECTRIC HEATERS IMBEDDED IN THE LOWER BED PLATES CAN BE HEATED USING THE CONTROLLERS LOCATED ON THE MAIN OPERATOR PANEL. TEMPERATURE RANGES UP TO APPROX 100C CAN BE CONTROLLED IN EACH OF THE TWO OVENS. THE OVENS HAVE A VARIABLE SPEED FAN ON EACH OF THE EXHAUST DUCTS AND INCOMING AIR IS FILTERED THRU A 1 MICRON FILTER. INSIDE EACH OVEN IS A SET OF WHITE LED'S CONTROLLED BY AN ON/OFF TOGGLE SWITCH ON THE OUTSIDE COVERS NEXT TO THE VIEWING WINDOWS. TO AVOID INFLOW AMBIENT AIR INTRUSIONS, A NUMBER OF SILICON BAFFLE "CURTAINS" HAVE BEEN INSTALLED AND EACH TIME THE OVEN COVERS ARE OPENED, THESE CURTAINS SHOULD BE CHECKED TO BE SURE THEY ARE CORRECTLY ORIENTED AROUND THE STEEL BELT AND THE FILM. WHEN THE COVERS ARE LIFTED, RUBBER BUMPERS ALLOW THE COVERS TO TILT FULL REARWARD FOR ACCESS TO THE INSIDE AREA OF THE BELT PATH THRU THE OVENS.

HEATERS



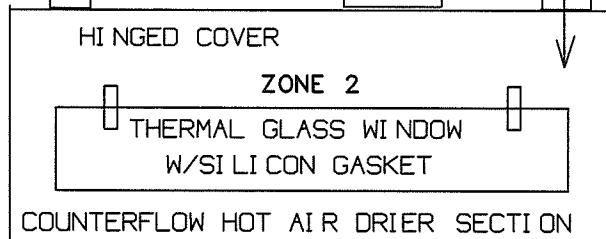
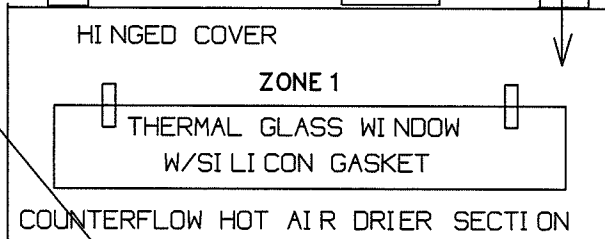
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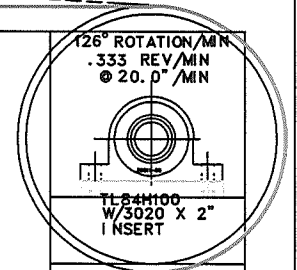
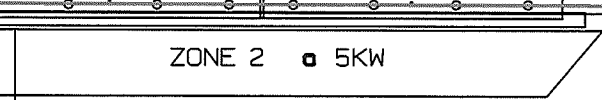
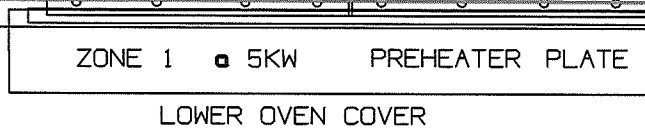


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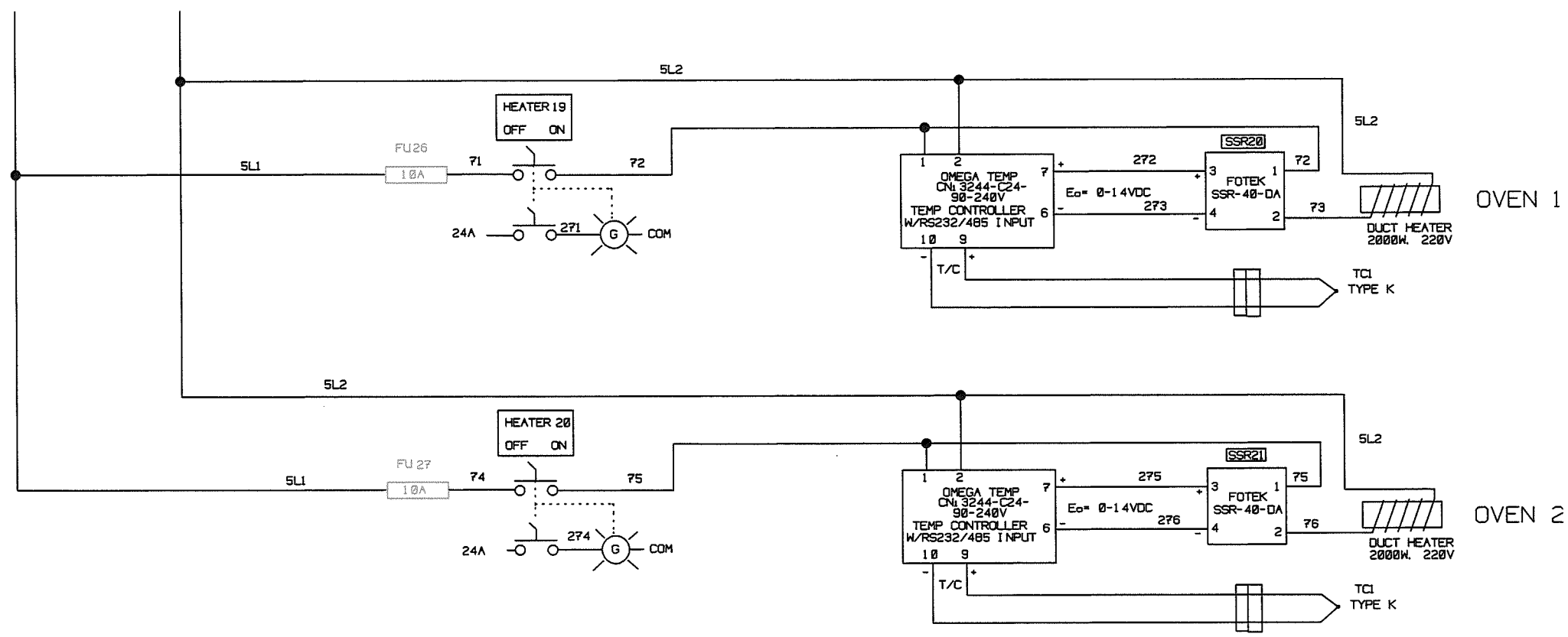
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COOLDOWN ZONE
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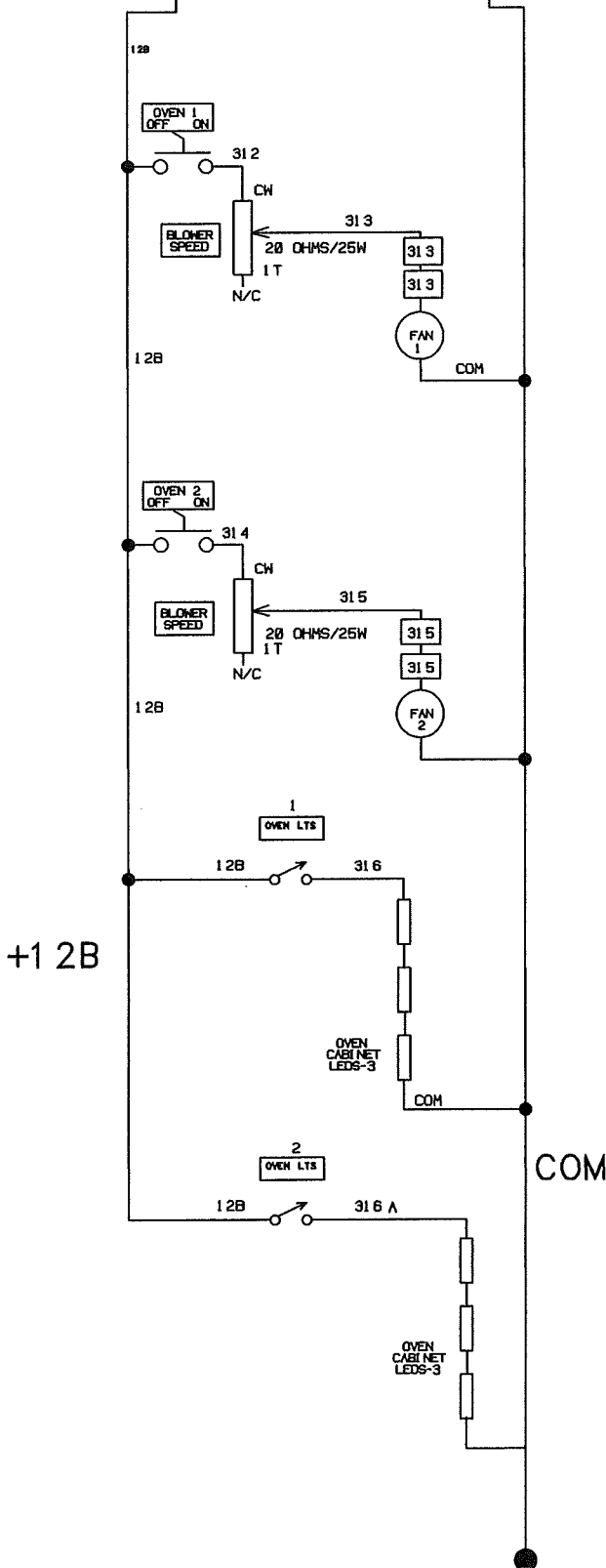
5L1 5L2



OVEN 1

OVEN 2

L1 PS4 L2
CL-180W-12V
+ -



DTX SERIES INSTRUCTION MANUAL

1. GENERAL INTRODUCTION

DTX series PID Temperature Controller is the new product developed by our company. It adopts special microcomputer adjusting method, employs switching power and surface mount technology (SMT), therefore, the controller is quite smart and reliable. Its special functions like auto diagnosing, auto setting and intelligent control. It can be used widely in the display and control of the parameter of the temperature, pressure, flow, and liquid level.

2. MAIN TECHNICAL INDEX

2.1 Input:

Thermocouple(TC),Resistance Temperature Detect (RTD)
Standard Current and voltage signals.

2.2 Display:

Process Value (PV)、 Setting Value(SV):-1999~+1999
Output (OUT1、 OUT2) Alarm (ALM1、 ALM2) Auto setting(AT)
Display: LED

2.3 Control way

- (1).PID Control(including ON/OFF, position PID and continuous PID)
- (2).Auto Setting Control

2.4 Accuracy

Measurement Accuracy:0.5%FS
Compensation error of cold terminal:2 °C(amend within 0~50°C by soft)
Resolution:14bit. Sampling period:0.5Sec.

2.5 Setting Range:

Setting Value(SV): same range with PV
Proportional Band(P):0~full range(ON/OFF Control when set to 0)
IntegrationTime(I):0~3600Sec(no integral action when set to 0)
Derivative Time(D):0~3600Sec(no derivative action when set to 0)
Proportional Period:1~100Sec
On-off control output hysteric loop width:1~100°C(or other PV units)

2.6 Control Output

- (1)Currency output: DC 0~10Ma,4~20mA(RL<500Ω)
- (2)Voltage output: DC 0-5V,1-5V(RL>10K)
- (3)Relay output: Contact capacity:250V AC 3A(resistive load)
- (4)Voltage Impulse output:0-12V(applicable for solid state relay SSR)
- (5)Silicon Controlled Rectifier(SCR) output: zero-cross triggering or phase-shift triggering(resistive load)
- (6)Alarming function output: 2 groups output at most,12 modes
Output Contact Capacity:250V AC 3A

2.7 Other Parameters

- (1)Insulation resistance:>50MΩ(500V DC)
- (2)Insulation strength:1500V AC/min
- (3)Power consumption:<10V
- (4)Service environment:0~50°C,30~85RH,no corrosive gas

3. OUTLINE MOUNTING BORING

Outline & boring size

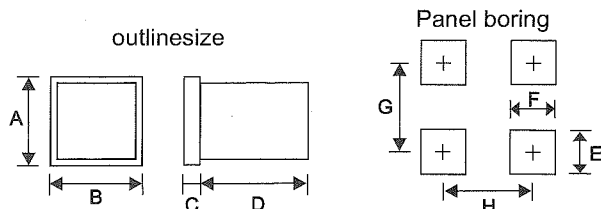
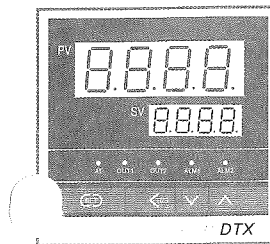


Fig. 1

Form 1

	A	B	C	D	E	F	G	H
DTXG	48	48	10	100	45	45	80	80
DTXE	96	48	10	100	92	45	116	80
DTXF	48	96	10	100	45	92	80	116
DTXD	72	72	10	100	68	68	96	96
DTXA	96	96	10	100	92	92	116	116

4. PANEL NAME AND FUNCTION



- PV: Measured value / mode display value
- SV: Setting value/mode display value
- AT: PID auto calculation indicator lamp
- OUT1: Output 1 indicator lamp
- OUT2: Output 2 indicator lamp
- ALM1: Alarm 1 indicator lamp
- ALM2: Alarm 2 indicator lamp

SET: Setting mode key <R/S: Shift key V: Up key Λ: Down key

5. MODEL DESCRIPTION AND MODEL SELECTION

DTX - - *

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

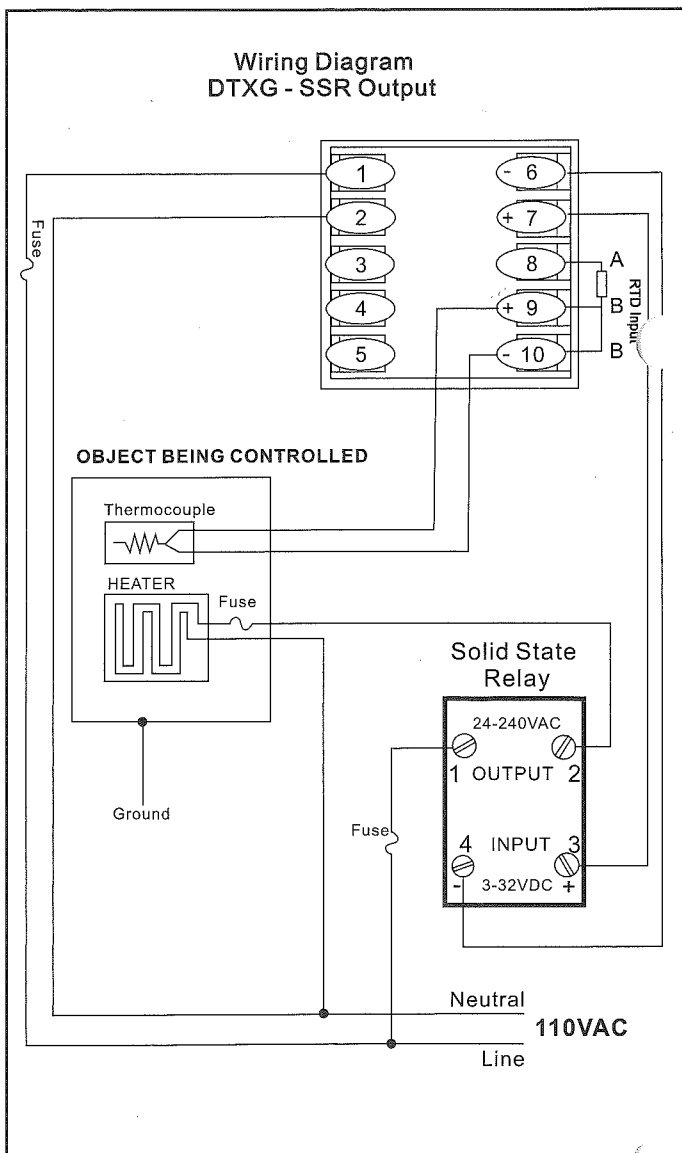
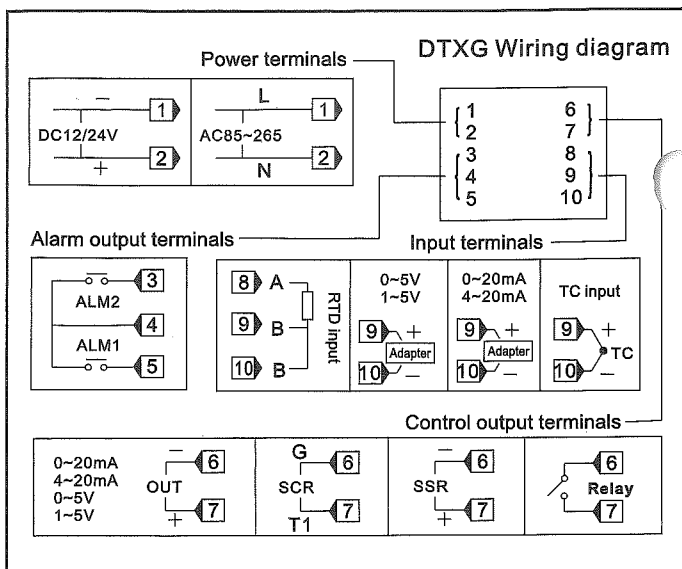
- ① Outline size(See Form 1)
- ② Control type
F:PID operation and auto calculation(Reverse operation)
D:PID operation and auto calculation(Forward operation)
- ③ Input type: refer to input range table (See Form 2)
- ④ Range Code: refer to input range code table
- ⑤ First Control Output(OUT1)(Heating side)
M: Relay contact output 8:Current output(DC 4~20mA)
V: Voltage impulse output
T: Hydration driving output
- ⑥ Second Control Output(OUT2)(Cooling side)
Null: when control operation is F or D
M: Relay Contact output 8: Current output(DC 4~20mA)
V: Voltage impulse output T: Hydration driving output
- ⑦ First Alarm(ALM1) ⑧ Second Alarm(ALM2)
N: No alarm
A: Upper-Limit bias alarm
B: Lower-Limit bias alarm
C: Upper/Lower Limit bias alarm
D: Alarm in area
E: Standby upper-limit bias alarm attached
F: Standby lower-limit bias alarm attached
G: Standby upper/lower limit bias alarm attached
H: Upper-Limit input value alarm
J: Lower-limit input value alarm
K: Standby upper-limit input value alarm attached
L: Standby lower-limit input value alarm attached

Form2:Input type & Input range code

Input type	Code	Input range	Code	Input range	Code	Input range	
Thermocouple (TC)	K	K01 0-200°C	K02 0-400°C	K03 0-600°C			
		K04 0-800°C	K05 0-1000°C	K06 0-1200°C			
		K07 0-137.2°C	K13 0-100°C	K14 0-300°C			
	J	J01 0-200°C	J02 0-400°C	J03 0-600°C			
		J04 0-800°C	J05 0-1000°C	J06 0-1200°C			
	R *1	R01 0-1600°C	R02 0-1769°C	R03 0-1350°C			
	S *1	S01 0-1600°C	S02 0-1769°C				
	B *1	B01 100-1800°C	B02 0-1769°C				
	E	E01 0-800°C	E02 0-1000°C				
	N	N01 0-1200°C	N02 0-1300°C				
T *2	T01 0-350°C	T02 -199.9-100°C	T03 -199.9-200°C				
		T04 -199.9-400°C					
RTD	PT100	D01 -199.9-649.0°C	D02 -199.9-200.0°C	D03 -199.9-50.0°C			
		D04 -100.0-100.0°C	D05 -100.0-200.0°C	D06 -100.0-50.0°C			
		D07 0.0-100.0°C	D08 0.0-200.0°C	D09 0.0-300.0°C			
		D10 0.0-500.0°C					
	JPT 100	P01 -199.9-649.0°C	P02 -199.9-200.0°C	P03 -199.9-50.0°C			
		P04 -100.0-100.0°C	P05 -100.0-200.0°C	P06 -100.0-50.0°C			
		P07 0.0-100.0°C	P08 0.0-200.0°C	P09 0.0-300.0°C			
		P10 0.0-500.0°C					
		Voltage Current	0-5V	401 0.0-100.0°C			
			-5V	601 0.0-100.0°C			
0-20mA	701 0.0-100.0°C						
4-20mA	801 0.0-100.0°C						

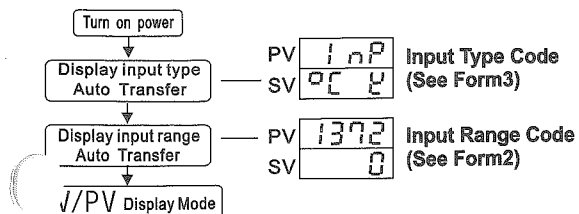
* 1, 0-399 °C Accuracy is not guaranteed.
* 2, -199.9-100°C Accuracy is not guaranteed.

6. TERMINAL CONFIGURATION



7. OPERATION PROCEDURES

7.1 Procedures of Starting



Form3 Input Type Code

Display	U	J	L	E	N	T	U	R	S	B	0	P	J	P	P	T	U
Input type	Thermocouple(TC)										RTD			Voltage			
	K	J	L	E	N	T	U	R	S	B	W5Re	PL	JPT	PT	PT		(Current)
											W26Re	II	100	100			

Note: When the input signal is current or voltage, you must use our appropriate current & Voltage input adapter

7.2 SV Setting Mode

Under SV/PV normal display state, first, press SET key to make the SV display in the flashing state, second, press the < key to find the place number of required setting temperature, third, press UP or DOWN key to set the required temperature, after ending the setting, press SET key again to let the meter come back to SV/PV normal display state.

7.3 Parameter Setting Mode

This parameter is used to set the alarming parameter, PID constant, etc, under the normal displaying state, press the SET key for three seconds, the PV display will show the parameter setting state, and SV display will show the corresponding value, then, press SET key in turn to display the parameter symbol specified in the following table:

Form4

Display symbol	Description	Setting range	Factory value
PV	Measured Value	Full range	
SV	Setting Value	Full range	
AL1	Alarm1 setting	Full range	50.0or50
AL2	Alarm2 setting	Full range	50.0or50
SETU	Self setting	0:Auto-setting for closing 1:Auto-setting for opening	0
P	Proportional band (Refer to*for heating side)	ON/OFF control when setting to 0	30 or 30.0
I	Integration time(s)	1-3600sec No derivative action when setting to 0	240
D	Derivative time(s)	1-3600sec No derivative action when setting to 0	60
Ar	Limit integration operation work range	Proportional band 1-100% (heating side)	100
r	Proportional Period (heating side)	1-100sec NO display when current outputs	Refer to*1
Pc	Proportional band (Cooling side)	1-1000% of proportional band(Heating band)	100
db	Dead Band	0000-01111	0&0.0
t	Proportional Period (Cooling side)	1-1000sec NO display when current outputs	Refer to*1
Pb	PV deviation amendment	PV amendment	0&0.0
LCK	Date lock	(refer to*2)	0000

Note: some parameter signals maybe not showed

- Relay contact output:20s, voltage impulse output or driving of gas control tube is made by trigger output or gas control tube output for 2s
- Data lock grade selects
 - Monitored only after data locked
 - Each alarm data(HBA.LBA.LBD) can be lock under the following grades 0001.0011.0111
- When LCK=0000 all data may be amended
- When LCK=0001, all data may not be amended except SV, AL1,AL2
- When LCK=0011, all data may not be amended except SV,
- When LCK=0111, all data may not be amended

7.4 Function Setting

When the meter is energized normally, find the data lock parameter LCK according to the parameter setting mode, SET the code to 1000, then press SET key to make the meter confirm, press both SET key and R/S key at the same time for 3s, the PV display will show Cod
When Cod=0000, press SET key in turn to get the following parameters in circular display: (See Form 6)

Form6

Display symbol	Setting value	Description		
SL1	0 0 0 0	K	Thermocouple(TC)	
	0 0 0 1	J		
	0 0 1 0	L		
	0 0 1 1	E		
	0 1 0 0	N		
	0 1 0 1	T		
	0 1 1 0	U		
	0 1 1 1	R		
	1 0 0 0	S		
	1 0 0 1	B		
	1 0 1 0	W5Re/W26Re		
	1 0 1 1	P12		
	SL2	0		°C Centigrade	Selection of nominal unit
1		°F Fahrenheit		
0		Air cooling(A type)	Selection of cooling method	
1		Water cooling(W type)		
0 0		Null		
SL3	0 0 0 0	Omit		
SL4	0 0 0	No set alarm 1 function	Selection of Alarm1(ALM) type	
	0 0 1	Upper-limit bias alarm		
	0 1 0	Upper/lower-limit bias alarm		
	0 1 1	Process value upper-limit alarm		
	1 0 1	Lower-limit bias alarm		
	1 1 0	With alarm (Alarm in area)		
	1 1 1	Process value lower limit alarm		
	0	No standby alarm function		Selection of alarm 1 standby function
1	With standby alarm function			
SL5		Setting of Alarm 2 function	Ditto	
SL6	0	Forward-operation control(Cooling)	Main forward/reverse operation selection	
	1	Reverse-operation control(Heating)		
	0	Main control time scalc output	Selection of main control output type	
	1	Main control continuous output(4-20mA)		
SL7	0	Excitation alarming	Excitation alarming/Non-excitation alarming(Alarm 1 side)	
	1	Non-excitation alarming		
	0	Non-excitation alarming		Excitation alarming/Non-excitation alarming(Alarm 2 side)
	1	Non-excitation alarming		
SL8	0 0 0 0	Omit		
SL9		0 Omit		
SL10	0	Non	Run/Stop function setting*2	
	1	Run/Stop function		
	0	Non	Selection of autocorrection function	
1	Autocorrection function			
SL11	0 0 0 0	Omit		

*1. Excitation alarming means alarm relay contact changes from NO to NC. Non-excitation alarming means alarm relay contact changes from NC to NO

*2. Run/Stop setting is effective, press "<R/S" key for about 2s, the device stop operating. PV window will display "Sf 0P", press "<R/S" key again for about 2s, return to work.

7.5 Constant Setting

When Cod=0001, press SET key in turn to get the following parameters in circular display: (See Form 7)

Form7

Display symbol	Description	Factory value
SLH	Upper limit of setting value measurement range	*
SLL	Lower limit of setting value measurement range	*
PODP	Place number of decimal	0001
oH	Main output no-operation bandwidth	2or2.0
AH1	Alarm 1 output no-operation bandwidth	2or2.0
AH2	Alarm 2 output no-operation bandwidth	2or2.0
CTr	Current transformer ratio (For wire break alarm transformer)	*
dF	Digital filter constant: range 0-100s	1sec
SFFn	Time factor of stable measuring value: range 0-200s	100
SFPY	Calculating factor of proportional band: range 0-200s	67
SFLY	calculating factor of integration: range 0-200s	16

* according to the order

7.6 Instrument Data viewing

When Cod = 0002, all data is the recorder of meter operation, can be only seen but not amended (See Form 8)

Form8

Display symbol	Description
TCU	Maximum temperature value of instrument input terminal air
GFH	Maximum use time of instrument, min unit 10000 hours
GFL	Minimum use time of instrument, min unit 1 hour

7.7 Failure Message Indicate

Fault information indication: When meter can't work normally, the meter diagnosed automatically to display the message prompt. (See Form 9)

Form9

Display symbol	Description
E r r	Meter occurs fault
o o o o	The wire is disconnected at inputting, the polarity is connected inversely or above input range
u u u u	The wire is disconnected at inputting, the polarity is connected inversely or below input range

8. OPERATION PROCEDURES (See Fig.3)

9. LINEAR INPUT ADAPTER WIRING DIAGRAM (See Fig.2)

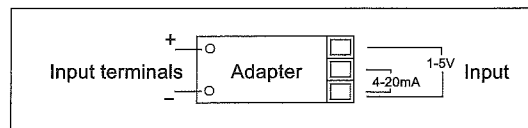


Fig.2

10. AFTER SERVICE

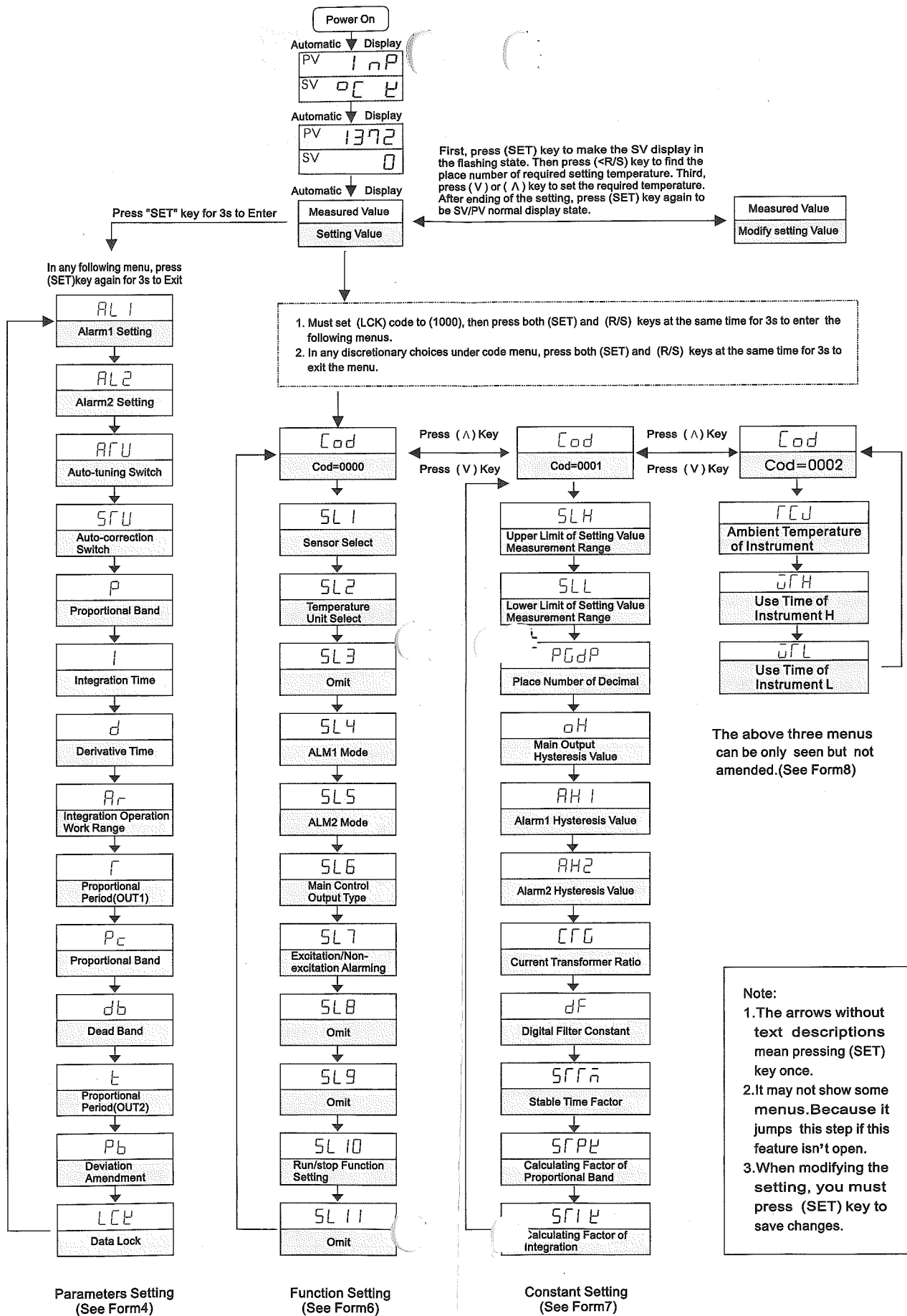
The instrument is guaranteed of 18-month free maintenance or changing after the date when product leaves the factory. For product damaged by mistake operating or product with expired warranty, the maintenance will require some reasonable charge. Besides, we can give the lifelong maintenance for our products.



About Safety Proceeding

- Before use the product, please read carefully this manual, then use it correctly on the base of understanding its content.
- The product can be used manufacture machinery, work machinery, calculation and measurement instrument (Don't use it for the medicine machine)
- If in the state of interruption or unusual may cause terrible system accident, please set proper protect electrical route outside, in case of the accident.

Fig.3 OPERATION PROCEDURES



CE

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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not used for use in, and should not be used for, patient-connected applications.

This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as the guide contains important information relating to safety and EMC.

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NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by following labels:

- NOTE
- WARNING or CAUTION
- IMPORTANT
- TIP



NOTE: Provides you with information that is important to successfully setup and use the iServer.



CAUTION or WARNING: Tells you about the risk of electrical shock.



CAUTION, WARNING or IMPORTANT: Tells you of circumstances or practices that can effect the instrument's functionality and must refer to accompanying documents.



TIP: Provides you helpful hints.

Before You Begin

Inspecting Your Shipment:

Remove the packing slip and verify that you have received everything listed. Inspect the container and equipment for signs of damage as soon as you receive the shipment. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent. The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing the contents, save the packing material and carton in the event reshipment is necessary.

Customer Service:

If you need assistance, please contact the Customer Service Department nearest you.

Manuals, Software:

The latest Operation Manual as well as free iSeries configuration software and iServer Mail Notifier are available at the website listed on the cover page of this manual or on the CD-ROM enclosed with your shipment.

**PART 1
INTRODUCTION**

1.1 Safety and EMC Considerations

! This device is marked with the international caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

This instrument is a panel mount device protected in accordance with EN 61010-1:2001, electrical safety requirements for electrical equipment for measurement, control and laboratory. Installation of this instrument should be done by qualified personnel. In order to ensure safe operation, the following instructions should be followed.

! This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall meet the relevant requirements of IEC 947-1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the main supply cord.

! Furthermore, to provide protection against **excessive energy** being drawn from the main supply in case of a fault in the equipment, an **overcurrent** protection device shall be installed.

- Note**
- Do not exceed voltage rating on the label located on the top of the instrument housing.
 - Always disconnect power before changing signal and power connections.
 - Do not use this instrument on a work bench without its case for safety reasons.
 - Do not operate this instrument in flammable or explosive atmospheres.
 - Do not expose this instrument to rain or moisture.
 - Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.
 - Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

Failure to follow all instructions and warnings may result in injury!

1.2 Description

Note This iServer board can be purchased as a stand alone unit, or as an option for an iSeries monitor/controller (Embedded Ethernet iServer) with a RS485 communication port interface. Some iSeries monitors/controllers do not utilize RS485 communications. In such models, the RS485 instructions do not apply.

The Embedded Ethernet Server is designed to connect industrial devices with serial interfaces to the Ethernet network using the TCP/IP protocol. It contains an Ethernet Server and RS-485/422 interfaces.

The standard features include:

- Use standard Web Browser, TCP connection, HTTPGET DOS program or Telnet Simulation for network connectivity.
- Install via RS-485/422 serial port connection.
- Transfer data from RS-485/422 serial interface to TCP/IP using built-in socket server.
- Use a standard home page or customize web page using special applets, which are available on our Web site.

The following example illustrates how you can hookup the devices with serial interface on the net using the Ethernet Server:

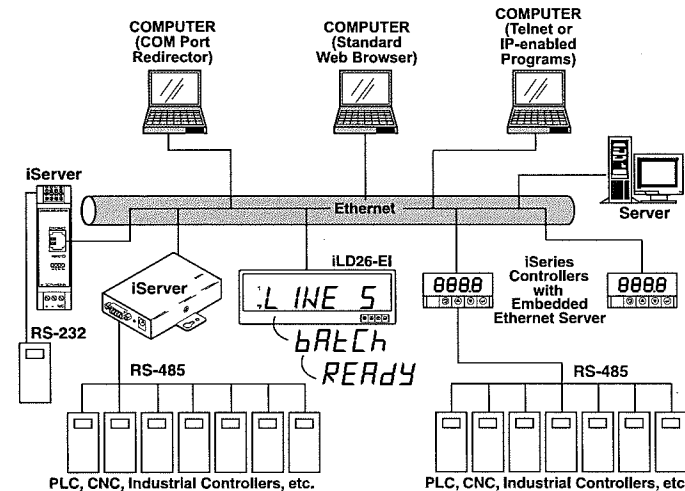


Figure 1.1 iServer on the Ethernet Network

**PART 2
HARDWARE**

2.1 Physical Characteristics and Mounting

For physical dimensions and installation instructions see Quickstart and Manual for iSeries monitor/controller.

2.2 Rear Panel of iSeries Meter with Embedded Ethernet Server

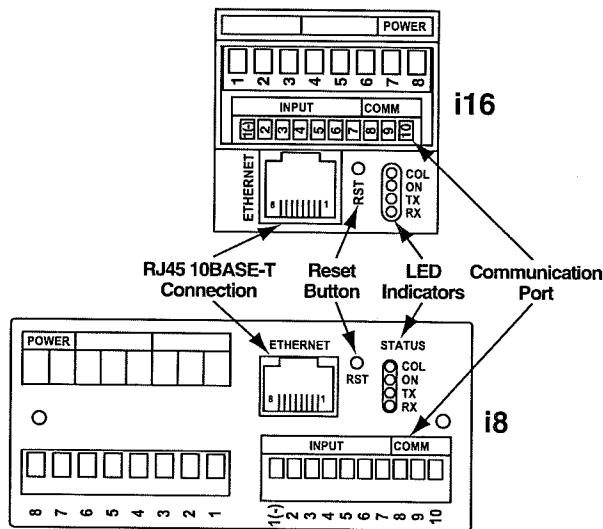


Figure 2.1 Rear Panel View of i16 and i8 Series Meters with Embedded Ethernet Server

2.3 DIP Switches on the iServer

For Dipswitch access you must remove the main board from the case. Refer to the Disassembly Instructions in your iSeries Monitor/Controller Quickstart Manual.

- 1 To change the IP address from the serial port
- 2 To change to default factory settings
- 3 To enable/disable DHCP
- 4 To enable/disable Terminal Server function

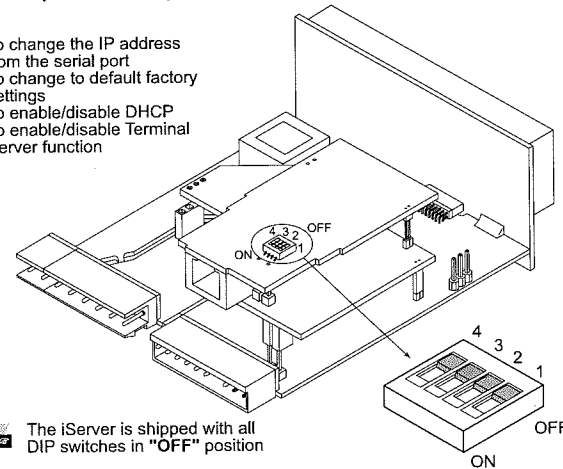


Figure 2.2 DIP Switches on the iServer

Table 2.1 Rear Panel Annunciators

Serial Communication Interface Section (For Models with RS485):	
Pin 10	-Rx/Tx
Pin 9	+Rx/Tx
Pin 8	Return, Common Ground Shield connection
Network Communication Interface Section:	
ETHERNET	RJ45 interface for 10BASE-T connection.
RESET	Button: Used for power resetting the iServer.
COL / ACTIVITY	LED (Red) Blinking: Indicates network activities (receiving or sending packets).
ON / NET LINK	LED (Green) Solid: Indicates good network link.
TX	LED (Yellow) Blinking: Indicates transmitting data to the serial port.
RX	LED (Green) Blinking: Indicates receiving data on the serial port.

2.5 Network Communication Interfaces

2.5.1 10Base-T RJ-45 Pinout

The 10BASE-T Ethernet network (RJ-45) system is used in the iServer for network connectivity. The 10 Mbps twisted-pair Ethernet system operates over two pairs of wires. One pair is used for receiving data signals and the other pair is used for transmitting data signals. This means that four pins of the eight-pin connector are used.

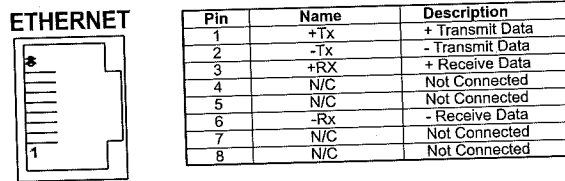


Figure 2.4 RJ45 Pinout

2.5.2 10Base-T Crossover Wiring

When connecting the iServer directly to the computer, the transmit data pins of the computer should be wired to the receive data pins of the iServer, and vice versa. The 10Base-T crossover cable with pin connection assignments are shown on Figure 2.5.

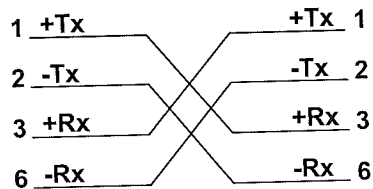


Figure 2.5 10Base-T Crossover Cable Wiring

Note Use straight through cable for connecting the iServer to an Ethernet hub. The ports on the hub are already crossed.

PART 3 NETWORK CONFIGURATION

3.1 Network Protocols

The iServer can be connected to the network using standard TCP/IP protocols. It also supports ARP, HTTP (WEB server), DHCP, DNS and Telnet protocols.

3.2 Ethernet (MAC) Address

MAC (Media Access Control) address is your computer's unique hardware number. When you're connected to the LAN from your computer, a correspondence table relates your IP address to your computer's physical (MAC) address. The MAC address can be found on the label of your device and contains 6 bytes (12 characters) of hexadecimal numbers XX:XX:XX:XX:XX:XX hex

For example: 0A:0C:3D:0B:0A:0B

Note Remove the small label with the default IP address and there will be room to put your IP address. See Figure 3.1 and Figure 3.2.

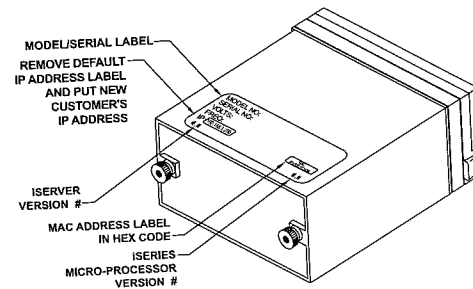


Figure 3.1 i8 - Labeling

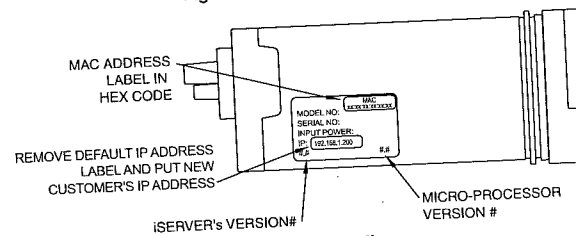


Figure 3.2 i16 - Labeling

3.3 DHCP

DHCP, Dynamic Host Configuration Protocol enables individual computers or devices to extract their IP configurations from a server (DHCP server). If the DHCP is enabled on your iServer, as soon as the iServer is connected to the network, there is an exchange of information between DHCP server and the iServer. During this process the IP address, the Gateway address, and the Subnet Mask will be assigned to the iServer by the DHCP server. Note that the DHCP server must be configured correctly to do such assignment.

If fixed or static IP address is desired, the DHCP must be disabled. The iServer is shipped with DHCP disabled (factory default). The DHCP can be enabled by setting the DIP switch # 3 to the "ON" position (refer to Figure 3.3).

Note DIP switch # 3 shown in "ON" position

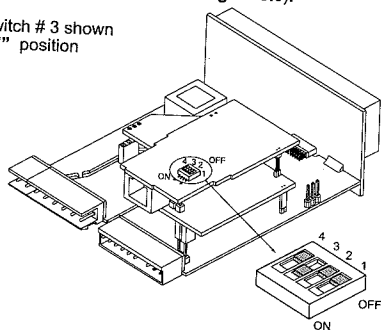


Figure 3.3 DIP Switch on the iServer

3.4 DNS

DNS, Domain Name System enables individual computers and devices to be recognized over a network based on a specific name instead of an IP address. For example, instead of having to use <http://192.168.1.200> (IP address), you would use only <http://eis03ec> or any eight character name stored as Host Name under Access Control menu in the iServer Home Page. The default DNS name for an iServer is "eis" followed by the last four digits of the MAC address of that particular iServer.

- Note**
1. It is very important to communicate with the network administrator in order to understand the DHCP and its existing configurations on the host server, before enabling the DHCP on the iServer.
 2. The iServers are shipped with a default static IP address of 192.168.1.200 and Subnet Mask of 255.255.255.0.
 3. On Novell networks or Windows 2000 where the DCHP is an updated function of DNS this feature may be beneficial since a particular name can be assigned eliminating the need for the IP address, as described in Section 3.4.

3.5 IP Address

Every active device connected to the TCP/IP network must have a unique IP address. This IP address is used to build a connection to the iServer's serial port. Every computer using TCP/IP should have a unique 32-bit address. It is divided into two portions, the network ID and the host ID. For instance, every computer on the same network uses the same network ID. At the same time, all of them have a different host ID. For more details about the IP address see Appendix B.

3.5.1 Default IP Address

The iServer is shipped with a default IP address set to 192.168.1.200 and Subnet Mask of 255.255.255.0. If you are going to use a Web browser or Telnet program to access the iServer using its default IP address, make sure that the PC from which you're establishing the connection has an IP address that is in the same range as the iServer's IP address (192.168.1.x, where x can be any number from 1 to 254).

Note Your PC's IP address cannot be the same as the iServer's IP address).

You also need to make sure that your PC's Subnet Mask is 255.255.255.0. This is a good way to access the iServer over the network and make any configuration changes needed. If the factory default address is already in use on your network, use an Ethernet crossover cable between your computer and the iServer and modify the IP address or any other settings within the iServer.

3.6 Port Number

All TCP connections are defined by the IP address and a port number. A port number is an internal address that provides an interface between an application running on your computer and the network through the TCP/IP protocol.

There are three default TCP socket port numbers assigned to the iServer:

1. Port (socket) number 1000 when using HTTPGET program.
2. Port (socket) number 2000 when trying to access your serial device connected to the serial port of the iServer.
3. Port (socket) number 2002 when trying to access the iServer itself for reading or changing the settings. This can be done using Telnet application.

Example: C:\>Telnet 192.168.1.200 2002

**PART 4
OPERATIONS**

An industrial device with serial interfaces (PLC, CNC controllers, PC, Data Display Devices, etc.) can be connected to the serial port of the Web Server.

4.1 SERIAL INTERFACE CONFIGURATION - Communication Protocol

A data communication protocol defines the rules and structure of messages used by all devices on a network for data exchange. A typical transaction will consist of a request to send from the MASTER followed by the response from one or more SLAVE devices. Either a single (point-to-point) or multi-drop network (multi-point) is possible.

4.2 Command Structure

There are different command types associated with communication between the Ethernet Server and your device shown in Table 4.1, which shows the Command Prefix Letters (Command Classes)

Table 4.1 Command Prefix Letters

COMMAND PREFIX (COMMAND CLASS)	MEANING
^AE	Special read, Communication parameters
P (Put)	Write HEX data into RAM
W (Write)	Write HEX data into EEPROM.
G (Get)	Read HEX data from RAM
R (Read)	Read HEX data from EEPROM
U	Read status byte
V	Read measurement data string in decimal format
X	Read measurement data values in decimal format
D	Disable
E	Enable
Z	Reset

4.3 Command Formats

Table 4.2 shows the command formats for the Ethernet Server.

Table 4.2 Command Formats

For "P" and "W" Command classes:	For "G" and "R" Command classes:	For "X", "V", "U", "D", "E", & "Z" Command classes:
Point-to-point mode * ccc<data><cr>	Point-to-point mode * ccc <cr>	Point-to-point mode * ccc <cr>
Multi-point mode * nnccc <data>] <cr>	Multi-point mode * nnccc <cr>	Multi-point mode * nnccc <cr>

Where:

"*" is the selected Recognition Character. You may select any ASCII table symbol from "!" (HEX address "21") to the right-hand brace (HEX "7D") except for the caret "^", "A", "E", which are reserved for bus format request.

"ccc" stands for the hex-ASCII Command Class letter (one of eleven given in Table 4.1), followed by the two hex-ASCII Command Suffix characters identifying the meter data, features, or menu items to which the command is directed.

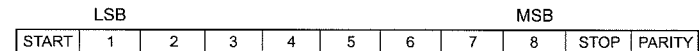
"<data>" is the string of characters containing the variable information the computer is sending to the meter. These data (whether BCD or binary) are encoded into hex-ASCII character (see Appendix D for binary-hex-ASCII chart), two characters to the byte. Square brackets [indicating optional status] enclose this string, since some commands contain no data.

"<nn>" are the two ASCII characters for the device Bus Address of RS485 communication. Use values from "00" to hex "C7" (199 decimal).

The following format is used for each byte sent and received through serial port of Ethernet Server:

1. Seven or Eight-bit binary, Hexadecimal (0 ... 9, A ... F)
2. Two hexadecimal characters contained in each eight-bit field of the message
3. 1 start bit; 7 or 8 data bit; 1 Stop Bit; Odd, Even (No Parity) Bit

The figure below shows the bit sequences when a byte is transmitted or received through the Ethernet Server.



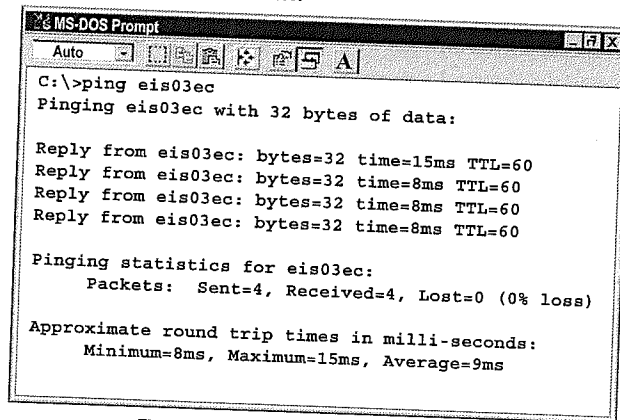
LSB – Least Significant bit
MSB – Most Significant bit

Least Significant beat sent first

4.4 OPERATIONS

This iServer can be used and configured in several ways, depending on user's preference and network setup. It can be used in Telnet simulation mode where it emulates serial communication operation over a network cable or directly from a Web browser, like Netscape or Internet Explorer.

If DHCP and DNS servers are used, the connection is very simple, you do not need to worry about IP address, MAC address, or network conflicts, all of these issues are solved for you by your network DHCP and DNS server. All that is left for you to do, is to use a straight/normal network cable to connect the device to a hub and power it up. Then you can go to your computer that is connected over the same network and from the MS-DOS Prompt window type "ping eisxxxx" followed by the last four digits from the MAC address located on the side or back of the device.



```
MS-DOS Prompt
Auto
C:\>ping eis03ec
Pinging eis03ec with 32 bytes of data:

Reply from eis03ec: bytes=32 time=15ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60

Pinging statistics for eis03ec:
    Packets: Sent=4, Received=4, Lost=0 (0% loss)

Approximate round trip times in milli-seconds:
    Minimum=8ms, Maximum=15ms, Average=9ms
```

Figure 4.1 Pinging eis03ec MS-DOS Prompt

This proves that the connection is proper and you can get into configuration or run mode using the Telnet or Web browser.

4.5 Setup and Operation Using a Web Browser

- Start your web browser.
- From the browser you type <http://eisxxxx> using the last four-digits from the MAC address label located on the device if DHCP and DNS are used. If a static IP address is used, then simply type <http://x.x.x.x>, where x.x.x.x is the iServer's IP address.
- The Home Page, shown below, will be displayed.
- From the drop-down window you can select the type of device connected (iSeries, iDRN, iDRX, iR2, INFB, or iLD) then press Update to get to the Home Page.

4.5 Setup and Operation Using a Web Browser (continued)

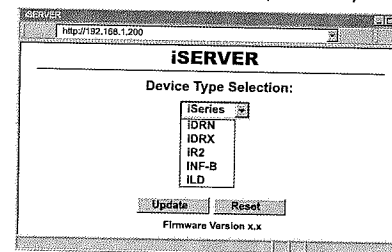


Figure 4.2 Device Type

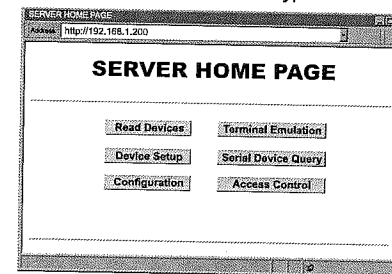


Figure 4.3 iServer Home Page Menu

In order to access certain menu items of the iServer Home Page, users may be prompted for a Login Password.

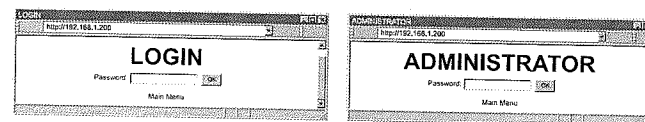


Figure 4.4 Login and Administrator Passwords

Login Password: This allows users to access and modify all of the iServer Home Page menu items, except "Access Control", which requires an Administrator password (refer to Section 4.5.5). The "Read Devices" does not require a password.

The default Login password is 12345678. This password can be up to 16 alpha-numeric case-sensitive characters.

4.5.1 Read Devices

- Read variables from up to eight different devices.
- Read up to eight variables from the same device.
- Read and write the setpoint values to the device.

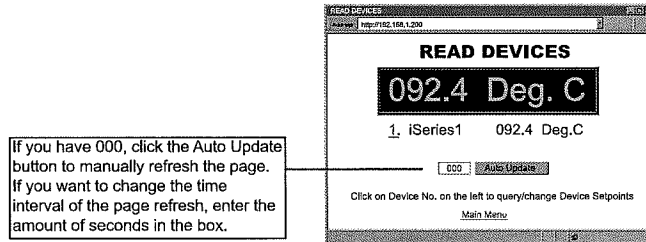


Figure 4.5 Read Devices

4.5.1.1 Device Setpoints

- When you click on Device No in the Read Device Page, you can edit the Setpoints.

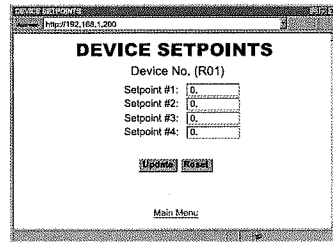


Figure 4.6 Device Setpoints

4.5.2 Send Raw Command

- Send single command and receive response.

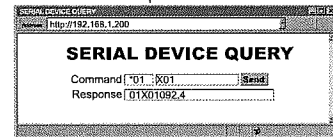


Figure 4.7 Serial Device Query

4.5.3 Device Setup

- Device Setup helps you to see eight different variables or devices by "Check" box.
- Up to four different devices or parameters can be modified.
- Device Address or ID is in Hex format. See Appendix D for conversion.

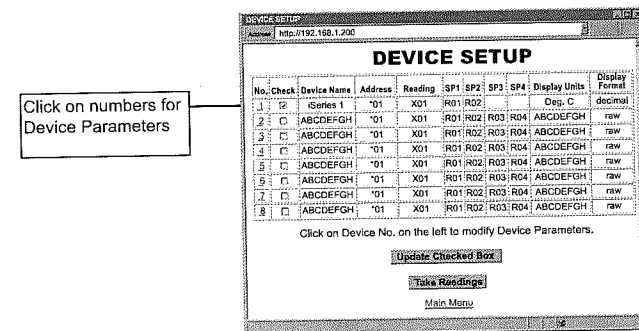


Figure 4.8 Device Setup

4.5.3.1 Modify Device Parameters (or Device List Entry)

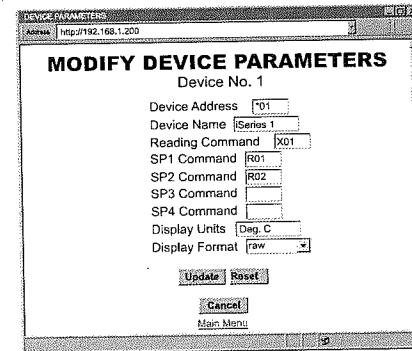


Figure 4.9 Modify Device Parameters

4.5.4 Configuration

- This section explains the Configuration page of the iServer's Web interface.
- When connecting your device to the iServer, the Serial Communications parameters must match, between the iServer and your serial device.

The screenshot shows a web browser window titled 'CONFIGURATION' with the address 'http://192.168.1.200'. The main content area is titled 'CONFIGURATION Serial Communication'. It is divided into three sections: A, B, and C.

Section A: Serial Communication

- Baud Rate: 9600
- Data Bit: 7 Bits
- Parity: odd
- Stop Bits: 1 bit
- Flow Control: none
- Transceiver: RS-485
- Modbus/TCP: disable
- End Character (Hex): 0D
- Forward End Char: enable
- Timeout: 0500 msec
- Serial Port Password: disable
- Serial Port Password: 1234abcd

Section B: Terminal Server

- TCP/UDP: TCP
- Server Type: slave
- Number of Connections: 0
- Local Port: 02000
- Connection Ctrl: not used
- Device No.: 1
- Connection Timeout: 00100 msec

Section C: Remote Access (Tunneling)

- Remote Access: disable
- Remote IP Address: 0.0.0.0
- Remote Port: 02000

Buttons: Save, Reset, Main Menu

Figure 4.10 Configuration

4.5.4.A Serial Communication

Baud Rate: The speed on the serial port and can be set from 300 to 115,200 bits/s (default is 9600 bits/s.)

Data Bit: Options are 7 or 8 (default is 7 bits.)

Parity: Options are Odd, Even, and None (default is Odd.)

Stop Bits: Options are 1 and 2 bits (default is 1 bit.)

Flow Control: Options are Software Flow Control (Xon/Xoff), Hardware Flow Control (CTS/RTS), and None (default is None.)

4.5.4.A Serial Communication (continued)

Transceiver: Can either be set to RS-232 or two-wire RS-485 (default is RS-485.)

Modbus/TCP: A widely used protocol mainly in industrial automation applications with default TCP port number of 502 (see Local Port field). The options are Enable and Disable. If enabled, the Modbus/TCP is the only protocol driven by the iServer on its LAN port. If disabled, the TCP/IP is the only protocol driven by the iServer on its LAN port (default is disable).

End Character: When the defined Hex character is received by the iServer on its serial port, the iServer will forward the buffered serial data to the Ethernet. The default value is 00, which forces the iServer to forward the data to the Ethernet as it receives the data on its serial port (this means that the iServer requires NO "end character" to forward the data).

Forward End Char: If enabled, the iServer will send the End Character out to the Ethernet as part of the data. If disabled, the iServer will not count the End Character as part of the data and will drop it (default is enabled.)

Timeout: In RS232 connection, if the iServer does not receive any more serial data within the given time value, the iServer will forward the buffered serial data to the Ethernet. For example, if the Timeout is set to 200 ms, the iServer will send out the buffered serial data to the LAN, if it does not receive any more data on its serial port for a period of 200 ms.

In RS485 connection, the Timeout value is used to switch between serial transmit and receive mode. Since the iServer supports 2-wire RS485, it needs to either transmit or receive serial data and the Timeout value determines the time interval for each. The range can be from 0 to 9999 ms (default is 500 ms).

4.5.4.B Terminal Server

TCP/UDP: The iServer supports TCP and UDP protocol (default is TCP). If UDP is selected, it can be configured either for Broadcast UDP or Directed UDP. In case of Broadcast UDP, the iServer will transmit the serial data to every node on the network. This can be accomplished if the Remote IP Address is set to 255.255.255.255.

The Broadcast UDP is a practical solution when one device needs to communicate with multiple PC's or devices over the network (one-to-many connection). In the case of directed UDP, the iServer will transmit the serial data to a specific node on the network (one-to-one connection). This can be accomplished if the Remote IP Address is set to the IP address of that specific node.

Server Type: In most cases the iServer will be acting as a Slave device. Slave option is chosen when a network host needs to connect to the serial port of the iServer (default is Slave)

Number of Connections: The range is from 0 to 5. If 0 is selected, the Terminal Server feature is disabled. That means that no network connection can be made to the serial port of the iServer. If 1 is selected, only one network connection can be made to the iServer's serial port. Any number more than 1 would allow the network hosts to monitor (read only) the traffic on the iServer's serial port simultaneously, but only one network host would be allowed to read and write (default is 0).

Local Port: This is the port or socket number for the iServer's serial port. Any number between 500 and 9999 can be defined with the exceptions of 1000 and 2002 which are already used by the iServer for other purposes.

Note If the "Number of Connections" is set to 0, the iServer's "Local Port" will be 1000, regardless of the displayed value inside the "Local Port" box. Once the "Number of Connections" is changed to a non-zero number (1 - 5) the "Local Port" value will be what is inside the box, this value by default indicates 2000 and is changable.

4.5.4.B Terminal Server (continued)

Connection Control: Some serial devices accept connections or disconnect connections based on certain signal conditions. For example, a serial device may accept a connection only if the incoming DTR signal (connected to device's DSR or DCD) is high or low. In this case, when the iServer receives the TCP connection, before it forwards it to its serial port, it must raise its DTR (DTR+) or to lower its DTR (DTR-). The iServer is capable of doing this with any of the hardware or modem control signals (DTR, DSR, DCD, RTS, and CTS).

Note "Reconnect" is one of the options in the Connection Control menu. This option can be used in the Serial Tunneling described in **Section 4.11**. If the connection in Serial Tunneling is broken due to network problems, power failure, etc., the Reconnect option will try to get the connection back on line every whatever the "Connection Timeout" is set to. For Example, if the Connection Timeout is set to 1000 x10 ms or 10 seconds, then every 10 seconds the iServer attempts to reconnect and reestablish the serial tunnel to the other network node.

Device No.: Refer to **Section 4.5.1**

4.5.4C Remote Access: This option needs to be enabled when Serial Tunneling is configured. The Serial Tunneling is explained in detail in **Section 4.11**.

Note Changes made in the iServer's Configuration page can be saved permanently by pressing the Save button. Pressing the Reset button will set all the fields back to their default values.

4.5.5 Access Control

This section describes the "Access Control" page of the iServer's Web interface. This page allows the users to set up the network and security parameters of the iServer. To get into the Access Control page, the user will be prompted with an Administrator Password. The default Admin password is **00000000** and is changeable, if desired. At the initial entrance to the "Access Control" page you will be prompted for the Login Password (see **Figure 4.4**) prior to an Administrator Password.

ACCESS CONTROL

Address: http://192.168.1.200

ACCESS CONTROL

Login Password

Admin Password

Web Server

Host Name

MAC Address

IP Address

Gateway Address

Subnet Mask

[Main Menu](#)

Figure 4.11 Access Control

Login Password: This allows users to access and modify all of the iServer Home Page menu items, except "Access Control", which requires an Administrator password. The default Login password is **12345678**. This password can be up to 16 alpha-numeric case-sensitive characters.

If there is no Login Password assigned (blank box) the iServer will not require a password to access and modify iServer Home page menu items.

Admin (administrator) Password: This allows users to access and modify the "Access Control" page. The default password is **00000000**. This password can be up to 16 alpha-numeric case-sensitive characters.

If there is no Administrator Password assigned (blank box) the iServer will not require password to access and modify "Access Control" page.

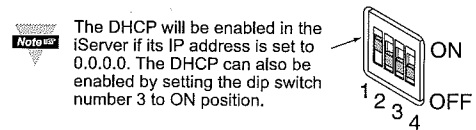
Web Server: This will allow or disallow accessing the iServer's Web server using an Internet browser (default is enabled.)

4.5.5 Access Control (continued)

Host Name: Refer to Section 3.4, DNS.

MAC Address: This is also called Hardware address or Ethernet address, which is assigned to the iServer at production. The MAC (Media Access Control) address is the iServer's unique hardware number and is not changeable.

IP Address: The IP (Internet Protocol) address is a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Ethernet or the Internet. The iServer's default IP address is 192.168.1.200. The iServer's IP address should be changed to fit user's networking environment. Consult with your IT department for obtaining an IP address.



Gateway Address: A gateway is a network point that acts as an entrance to another network. A gateway is often associated with a router, which knows where to direct a given packet of data that arrives at the gateway. If the iServer is sending packets to another network node that is not on the same network on which the iServer is connected, a gateway address needs to be given to the iServer. The gateway address should be the IP address of the router connected to the same LAN to which the iServer is connected. The iServer's default gateway address is 0.0.0.0. Consult with your IT department for obtaining a gateway address.

Subnet Mask: It's a 32-bit number that is used to determine which part of the IP address

Note Changes made in the iServer's Access Control page can be saved permanently by pressing the Save button and power recycling the iServer (press Power Recycle button). Pressing the Reset button will set all the fields back to their default values.

4.6 Setting a New IP Address over the Network

The iServer is shipped with a default IP address of 192.168.1.200 and Subnet Mask of 255.255.255.0. You can configure your PC's Network connection with an IP address that is in the same range as the iServer's IP address (192.168.1.x) and connect to the iServer using a crossover network cable between your PC and the iServer.

With this completed, you can go to the DOS-Prompt and ping 192.168.1.200. If you receive responses back (similar to Figure 4.1), you can go to the Web browser and type in <http://192.168.1.200> and it will take you to the Device Type page and then to the Home Page.

Select Access Control button, you'll be asked for the password. First default Login password is "12345678" and the Admin password is "00000000", then you should be on the administrator setup page where you can simply type in the desired Static IP address, and click Save.

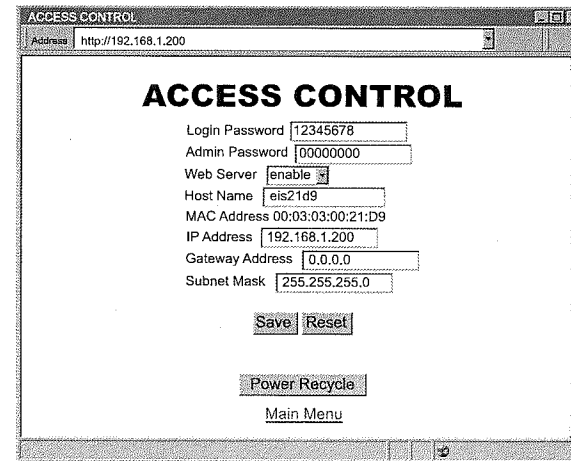


Figure 4.12 Access Control

Note For the IP address to take effect the iServer needs to be turned OFF/ON or press the Reset button.

Once all of this is done, you can connect the iServer to an Ethernet hub using a straight through cable, power it up, and follow the ping routine mentioned in the previous section.

4.7 Terminal Server Function

It is used to provide dedicated connectivity between computers and serial devices through the iServer over the Ethernet, without dedicated wiring. The typical Internet protocol consists of a request and a replay to that request. In this situation the server is the Host that generates the request and receives the replay from the device, that gets forwarded to the appropriate party on the network. But there are specific applications where a message is generated by the device, and the server is simply passing the data to the appropriate party on the network, in this situation the server acts as Slave. Examples are the Attendance Time Clocks, Bar Code Readers, remote Displays or Electronic signboards, etc.

For the iServer to pass the data back and forth between its Serial and Ethernet interfaces, the Terminal Server option needs to be configured as follows (Figure 4.13):

1. Set the Server Type to **Slave**
2. Set the Number of Connections to **0**.
3. Set the **Local Port** or Socket number to any number from 599 - 65535, except numbers 1000 and 2002.
4. Press the **Save** button to store the new settings.

From your application software on the host machine, you can now point to the IP address of the iServer and the assigned port number to establish a TCP connection to your serial device connected to the serial port of the iServer.

Note If DIP switch #4 is "ON",

Terminal Server function is always enabled, regardless of the firmware configuration.

By default, this DIP switch is set to "OFF" position.

You have the option to enable the Terminal Server feature either through the firmware or the DIP switch #4.

CONFIGURATION
Address: http://192.168.1.200

Serial Communication

Baud Rate: 9600 Data Bit: 7 Bits Parity: odd Stop Bits: 1 bit
Flow Control: none Transceiver: RS-485 Modbus/TCP: disable
End Character (Hex): 0D Forward End Char: enable Timeout: 0500 msec
Serial Port Password: disable 1234abcd

Terminal Server

TCP/UDP: TCP Server Type: slave Number of Connections: 0 Local Port: 02000
Connection Ctrl: not used Device No.: 1 Connection Timeout: 00100 msec

Remote Access (Tunneling)

Remote Access: disable Remote IP Address: 0.0.0.0 Remote Port: 02000

Save Reset
Main Menu

Figure 4.13 Terminal Server Configuration

4.8 Terminal Emulation

On this page you can send and receive data to and from the instrument. Simply, type the command in the open window and as you type the characters, the characters will be transmitted out from the serial port of the iServer.

If the command is more than one character, you must type the command in a different window and then use "copy" and "paste" options to drop the command in the Terminal Emulation window (the right mouse button will give you "copy" and "paste" options).

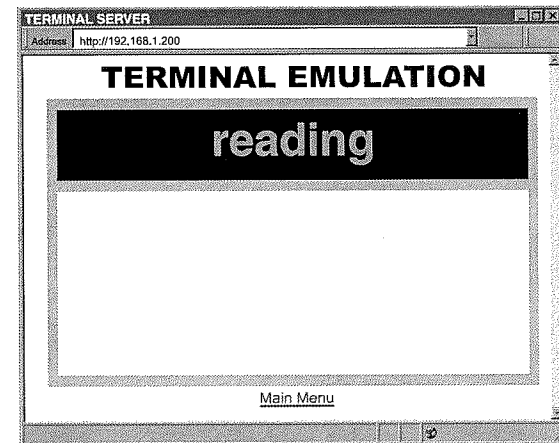


Figure 4.14 Terminal Emulation

4.9 Telnet Setup

Telnet stands for Telecommunications Network, is a protocol that provides a way for users (or clients) to connect to computers (or servers) on a network, whether in the next building or across the other side of the world.

You can open a Telnet session using other terminal emulation programs like Tera Term Pro (downloadable from the internet), which is a free software for MS-Windows. It supports VT100 emulation, Telnet connection and serial port connection.

Once the Telnet mechanism is decided we can open a session by simply typing the IP address of the iServer, and setting the Port on 2002 for logging into the iServer's serial port. page or 2000 for accessing the serial device connected to the iServer's serial port.

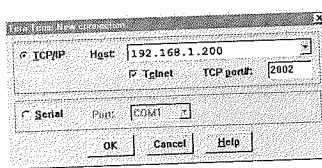


Figure 4.15
Tera Term Telnet Connection Screen

```

Firmware Version 4.1
Admin Password:00000000
Admin. Login Successful
P Configuration
Firmware Version 4.1
BD = 9600 (5)
PT = odd (1)
ST = 1 bit (0)
DT = 7 bits (0)
MD = RS-485 (1)
TO = 500
TT = SLAVE (1)
TN = 0
HN = eis1376
IP = 192.168.1.200
LP = 12345678
SP = 00000000
TP = iSeries (3)
RE = enable (1)
RI = 0.0.0.0
RP = 02000
GW = 0.0.0.0
SM = 255.255.255.0
EC = 0D
FP = 02000
FC = None (0)
MB = disable(0)
TU = TCP (0)
CC = not used(0)
CT = 01000
FE = enable (1)
EP = disable(0)
CP = 1234abcd
WB = enable (1)
MAC = 00:03:34:00:13:76
q
Quit
    
```

Figure 4.16 Telnet Setup
iServer Configuration Page

Note The default password for Telnet Login is 00000000 and can be changed if desired. Telnet works only in RS-232 mode

4.9 Telnet Setup (continued)

In the Configuration mode you can make any changes just like you would do using the Web Browser. After connected to the iServer, the user can use the following commands to read, modify, and get help from the iServer console.

- ? Following with a return character, the console will show all the commands and options (Figure 4.17).
- p Following with a return character, the console will show the iServer configurations (Figure 4.16).
- s Is the configuration command, used to set a new setting (see the example in Figure 4.17)
- r This command is used to read the status of the digital I/O signals (0 is low and 1 is high)
 - Example: r DCD response will be DCD (DSR)=0
 - r DTR response will be DTR=0
- w This command is used to change the status of the digital I/O signals (applies only to the outgoing signals, DTR and RTS)
 - Example: w RTS=1 means raise the RTS
 - w DTR=0 means lower the DTR

RESET following with a return character, it will recycle the Power on the iServer.
FACTORY following with a return character, it will set the iServer to it's factory default settings.

```

Admin. Password:00000000
Admin. Login Successful
iServer Configuration Command:
?
cc description          DDDDDDD
BD BaudRate             0-300,1-600,2-1200,3-2400,4-4800,5-9600,6-19200,
PT Parity                0-none,1-Odd,2-even
ST StopBits              0-1bits,1-2bits
DT DataBits              0-7bits,1-8bits
FC FlowControl           0-none,1-XON/XOFF,2-Hardware
MD Mode                  0-RS232, 1-RS485
MB Modbus/TCP            0-disable, 1-enable
TO TimeOut               xxxxx ms Rang range 100-9999
TU TCP/UDP               0-TCP, 1-UDP
TT TerminalType          0-Host, 1-Slave
TN TerminalNumber        0-5
PP TerminalPort          XXXXX 500-65535 but 1000 and 2002
HN HostName              XXXXXXXX maxim 18 characters
IP Static IP             XXX.XXX.XXX.XXX
LP Login Password        XXXXXX maxim 16 characters
SP Admin Password        XXXXXX maxim 16 characters
TP Device Type           0-iServer,1-iDRN,2-iDRX,3-iSeries,4-iNFB,5-iLD
RE Remote Enable         0-Disable, 1-Enable
RI Remote IP             XXX.XXX.XXX.XXX
RP Remote Port           XXXXX 500-65535 but 1000 and 2002
GW Gateway               XXX.XXX.XXX.XXX
EC End Char              XX represents the Hex Num. of ASCII. i.e 0D means CR
                          (Carriage Return)
FE Forward End Char      0-disabled, 1-enabled
EP Enable Serial Port Password 0-disabled, 1-enabled
CP Serial Port Password  XXXXXX maxim 16 characters
CC Connect CTRL          0-not used,1-RTS+, 2-RTS-, 3-CTS+, 4-CTS-, 5-RTS-CTS+,
                          6-RTS+CTS-, 7-DTS+, 8-DTR-, 9-DCD/DSR+,
                          A-DCD/DSR-, B-DTR-DCD+, C-DTR-DCD-, D-RECONNECT
CT Connect Timeout       XXXXX 1-65535
WB Web Server            0-disable, 1-enable
Example:
To configure Baudrate 9600, 1 stop bit, Odd Parity, and RS232 mode.
s -BD5 -PT1 -ST1 -MD0
    
```

Figure 4.17 Telnet Setup - iServer Help Page

4.10 HTTPGET Program

You can setup and read the information from the iServer by using the HTTPGET program. The following program can be used to read data from the embedded server firmware by using TCP port 1000. The command string sends to this TCP port, then it reads back the response from the same port. Whatever you write to the port goes to the serial port unmodified. Any response from the serial port can be read back from the same socket.

The Httpget.exe file is used to setup and read information from the iServer. This file will be automatically installed when you run any iServer related software available on our website and CD.

Example to use the "Httpget" program:

1. Create a directory C:\iServer\Httpget.
2. Copy httpget.exe and readme_features.doc files to this directory.
3. Make sure that you are in this directory and then enter the following test program:

```
C:\iServer\Httpget>httpget -r -S "01X01r" 192.168.1.200:1000
```

where:

"-r -S" are switches before the command string
"01" is device address (in hex format) for RS485 communication interface (skip for RS232)
"X01" read measurement data value (iSeries protocol)
"r" calls out a CR
"192.168.1.200" is an IP address
"1000" is a local port number

Respond:

01X01074.3

where:

"01X01" is Echo command
"074.3" is a display reading of the 4-digit device

Note In the example above the 4-digit iSeries controller has been connected to the serial communication port of iServer.

4.11 ARP Protocol

ARP is the Internet layer protocol responsible for determining the MAC (hardware) address that corresponds to a particular IP address. The ARP command allows the user to view the current contents of the ARP cache of the local computer (residing on the same network) or remote computer (residing on the different network) through a router.

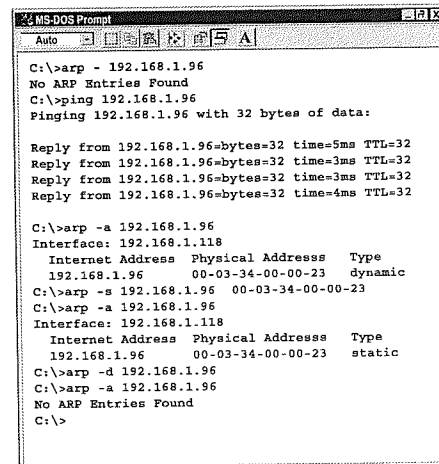
Microsoft includes the ARP.EXE utility for viewing and modifying the ARP cache with its Windows products. The following ARP commands can be used to view cache entries:

- **arp -a** → Use this command to view all ARP cache entries.
- **arp -a plus IP address** → Use this command to view ARP cache entries associated with one particular interface on a network with multiple adapters.
- **arp -g** → Same as arp -a.
- **arp -N** → Use this command to display ARP entries for specific network interface.
- **arp -s plus IP address plus Physical address** → Use this command to manually add a permanent static entry to the ARP cache.
- **arp -d** → Use this command to manually delete a static entry.

Note Ping the destination computer using IP address first before using the arp -a command.

The following window shows examples of arp commands and responses.

- Your computer has an IP address of 192.168.1.118
- The destination computer has an IP address of 192.168.1.96



```
MS-DOS Prompt
Auto
C:\>arp - 192.168.1.96
No ARP Entries Found
C:\>ping 192.168.1.96
Pinging 192.168.1.96 with 32 bytes of data:

Reply from 192.168.1.96:bytes=32 time=5ms TTL=32
Reply from 192.168.1.96:bytes=32 time=3ms TTL=32
Reply from 192.168.1.96:bytes=32 time=3ms TTL=32
Reply from 192.168.1.96:bytes=32 time=4ms TTL=32

C:\>arp -a 192.168.1.96
Interface: 192.168.1.118
   Internet Address   Physical Address   Type
   192.168.1.96       00-03-34-00-00-23 dynamic
C:\>arp -s 192.168.1.96 00-03-34-00-00-23
C:\>arp -a 192.168.1.96
Interface: 192.168.1.118
   Internet Address   Physical Address   Type
   192.168.1.96       00-03-34-00-00-23 static
C:\>arp -d 192.168.1.96
C:\>arp -a 192.168.1.96
No ARP Entries Found
C:\>
```

Figure 4.18 ARP Commands and Responses

4.12 Remote Access (Tunneling)

To "tunnel", in this context, is to transmit data between two points through a private conduit on a shared or public network. The network could be an Ethernet LAN, a WAN, or the Internet. The iServer allows for a connection between a serial device and a PC, or between two serial devices, using an existing network rather than dedicated wiring.

Today, there are number of serial devices like sensors, gauges, PLCs, card readers, security alarms, barcode scanners, data loggers, video cameras, ATM machines, time & attendance terminals, medical lab equipments, electronic signboards, and many others that are directly connected to PCs via their serial ports. These devices can be attached to shared Ethernet networks (TCP/IP protocol) and get accessed, controlled, and managed remotely using the iServer products. Any two iServer's can talk to each other over the Ethernet LAN, WAN, and Internet using TCP/IP protocol. Therefore, the connected serial devices to iServer's can also communicate with each other back and forth over these networks. This characteristic is called Tunneling and it's illustrated below.

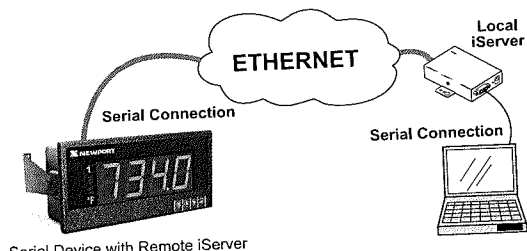


Figure 4.19 PC-to-Device Communication

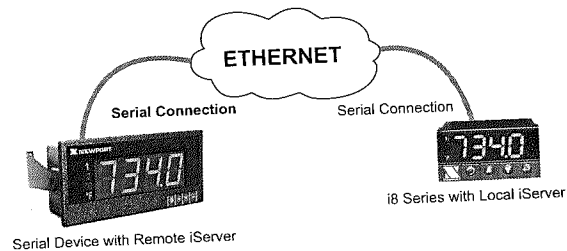


Figure 4.20 Device-to-Device Communication

In order to use this Tunneling feature, some settings are required within the local and remote iServer's.

4.12.1 Remote iServer

It's recommended to configure the Remote iServer and have it up and running before the Local iServer is configured.

1. A static IP address must be assigned to the Remote iServer. This means that the DHCP must remain disabled. Refer to the DHCP section of the user's manual for details.
2. Use a browser to access the Remote iServer's WEB page. Simply type the iServer's IP address at the browser's URL location (i.e. 192.168.1.50) followed by an Enter key. You should then see the iServer's main WEB page.
3. Click on the **Update** button.
4. Click on **Configuration**, you will be prompted with a **Password** (default is 12345678).
5. On the **Configuration** page, under **Serial Communication** section, make sure the parameters such as Baud Rate, Data Bits, Parity, Stop Bits, Flow Control, etc. match with your attached serial device.
6. Make sure to set the **End Character (Hex)** to **0D** and the **Timeout** to **500**.
7. Under **Terminal Server** section, set **Number of Connections** to 1 or higher.
8. Click on **Save** button for the changes to take place.

Make sure that the serial cable and communication settings between the iServer and the serial device are valid.

Note Figure 4.21 shows the valid values that need to be set in the Remote iServer. The Baud Rate, Data Bits, Parity, Stop Bits, Flow Control, and Transceiver values depend on what the serial device supports.

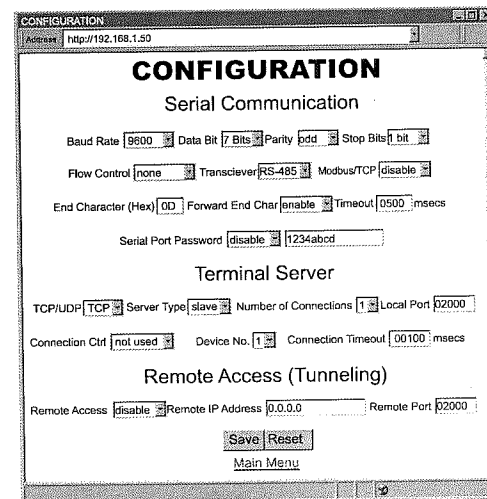


Figure 4.21 Configuration Menu - Remote iServer

4.12.2 Local iServer

1. An IP address should be assigned to the iServer dynamically or statically (recommended).
2. Use a browser to access the Local iServer's WEB page. Simply type the iServer's IP address at the browser's URL location (i.e. 192.168.1.49) followed by an Enter key. You should then see the iServer's main WEB page.
3. Click on the **Update** button.
4. Click on **Configuration**, you will be prompted with a **Password** (default is 12345678).
5. On the **Configuration** page, under **Serial Communication** section, make sure the parameters such as Baud Rate, Data Bits, Parity, Stop Bits, Flow Control, etc. match with your attached serial device and its application software.
6. Make sure to set the **End Character (Hex)** to 0D and the **Timeout** to 500.
7. Under **Terminal Server** section, set **Number of Connections** to 0.
8. Under **Remote Access** section, set the **Remote Access** to enable, Enter the **Remote IP address** (would be the IP address of the remote iServer, 192.168.1.50), and use the default **Remote Port** number 2000.
9. Set **Connection Control** to **Reconnect** and set the **Connection Timeout** to a desired value.

Note

The **Reconnect** option is used in Serial Tunneling and it applies only to the Local iServer. If the tunneling connection between the two iServers goes down due to network problems, power failure, etc., the **Reconnect** option will enable the Local iServer to reconnect with the Remote iServer based on the specified time interval in the **Connection Timeout**. For example, based on a timeout of 1000 x 10 ms (10 seconds), the Local iServer will continually attempt to reconnect and re-establish the tunnel with the Remote iServer every 10 seconds.

10. Click on **Save** button for the changes to take place.
11. Initialize the serial device application software to establish the connection.

Note Figure 4.22 shows the valid values that need to be set in the Local iServer. The Baud Rate, Data Bits, Parity, Stop Bits, Flow Control, and Transceiver values depend on what the attached device to the iServer supports.

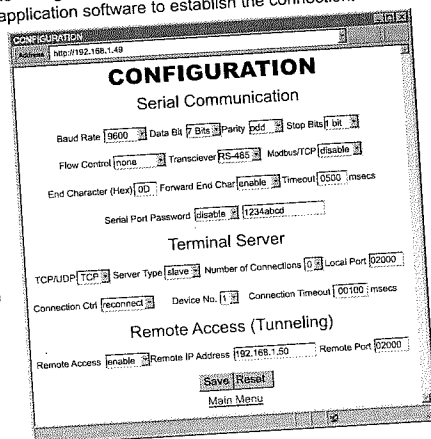


Figure 4.22 Configuration Menu - Local iServer

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4.13 Mail Notifier Software

The Mail Notifier Software can be used only with NEWPORT Electronics instruments. For complete information of how to use the Mail Notifier software, click on the Help menu of the main window.

The Mail Notifier software generates email notifications for alarm conditions. Users can be notified automatically of alarm conditions monitored via internet connections throughout the world. By use of the email forwarding of alarm conditions, alarm conditions can be monitored on a network isolated from the internet and forwarded to connections on the Internet.

The Mail Notifier utility operates under Windows 98, NT 4.0, 2000, and XP in conjunction with existing email that supports the MAPI messaging interface. If MS Outlook has been loaded, the MAPI support should be available.

4.13.1 Installation

The Mail Notifier must be loaded on a computer running Microsoft Windows (versions specified earlier) using an email program that provides MAPI access. Network access must be available between this computer and the iServer. Network access must also be available from this computer to the appropriate email server and from the email server to the recipient's email server.

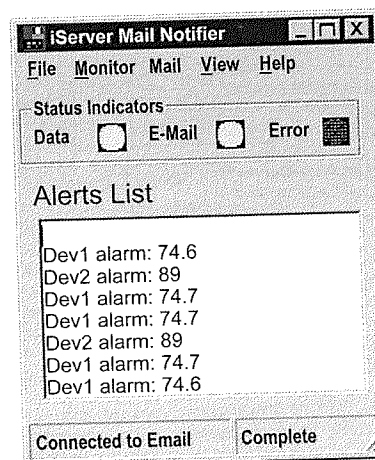


Figure 4.23 iServer Mail Notifier Main Window

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4.13.2 Program Options Setup and Configuration

Complete program setup requires:

- Entering a recipient for the email
- Specifying connection details to MAPI services.
- Defining alarms for devices, and selecting how and when the email will be active.

Figure 4.24 iServer Mail Notifier Profile Setup

The "Send To" tab contains a field to specify an email address to which alarm notifications will be sent (i.e. the recipient). Only one entry is permitted, in the address field. Additional addresses can be placed into "More Addresses" list.

Email Connection (MAPI Access)

The following instructions work with some versions of Microsoft Outlook. Note though that some email systems may prevent the use of Mail Notifier due to security constraints. The simplest way to obtain a connection the the Email services is as follows:

1. Configure the Mail Notifier to connect to the email by displaying a Login Box. This option is found by selecting View, Options from the Mail Notifier's menubar. Select the "Email Setup" tab, mark the checkbox for "Use Login Box"
2. After Mail Notifier is configured to use the login box, the Mail Notifier can be started without user intervention if your MS Outlook program is running beforehand. Otherwise, the Mail Notifier will display a Login Box that should display the necessary User Profile.

4.12.3 Device Setting and Configuration

Device setup requires:

- Entering the IP address for iServer device (for example 192.168.1.200).
- Specifying Socket number (1000 or 2000 depending on iServer settings).
- Defining RS485 Unit # interface address (1 to 199). Enter "0" for RS232 interface or for iServer.
- Entering Reading command. Normally set to X01 to obtain reading from the devices. If you want to change this setting, refer to HTTPget Section 4.10.
- Defining the Alarm setup (High/Low, High value, or Low value).
- Specifying Pause Interval. It determines how many seconds each subsequential alarm notification will be sent.
- Determining Monitor interval. It establishes the interval or time resolution in seconds for which readings will be obtained from the device.

Figure 4.25 iServer Mail Notifier Device Setting

**PART 5
SPECIFICATIONS**

SERIAL INTERFACE

Interface:
RS-422 or RS-485 (2 wire)

Data Rates:
300 to 115200 bps

Characters:
7 or 8 data bits

Parity:
odd, even, or none

Stop bits:
1 or 2

Flow Control:
Software (Xon/Xoff)
Hardware (CTS/RTS)

NETWORK INTERFACE

Interface:
Ethernet 10 Base-T

Connector:
RJ45

Protocols:
ARP, TCP/IP, ICMP, DNS, DHCP,
Telnet simulation and HTTP

Indicators (LED):
Col / Network Activity (red),
On / Network Link (green),
TX-Transmit (yellow),
RX-Receive (green),
Power (green)

PROCESSOR

CPU:
Enhanced 8051, 22 MHz

Memory:
16 Kbyte SRAM, 512 Kbyte Flash

Management:
Serial Login, Telnet Login,
Internal Web Server

INTERNAL WEB SERVER

Uses: Dynamic web pages and Java
applets (256 Kbyte capacity)

ENVIRONMENTAL

Operating Temperature:
0 to 50°C (32 to 122°F) 90%RH

Power Input
10-32 Vdc

Consumption:
2 W max

GENERAL

Agency Approvals
FCC-B, C/UL, CE

Software
Firmware upgradeable. Compatible with
Windows 9x / ME / NT / 2000 / XP software
and related utilities

Note Refer to the iSeries Manual and
Quickstart for physical
characteristics of iSeries devices
with the Embedded Ethernet Server.

**PART 6
FACTORY PRESET VALUES**

PRESET PARAMETERS	FACTORY DEFAULTS
Network Interface:	
IP Address	192.168.1.200
Gateway Address	0.0.0.0
Subnet Mask	255.255.255.0
Device Host Name	eis and Last 4 digits from the MAC address
Login Password	12345678
Admin Password	00000000
DHCP	Disabled
Serial Interface:	
Communication Protocol	RS-485
Flow Control	None
Baud Rate	9600
Parity	Odd
Stop Bit	1 bit
Data Bit	7 bits
Timeout	500 msec
End Character	0D (Hex) (Carridge Return)
Terminal Server:	
Server Type	Slave
Number of Connections	0
Port #	1000
Server Mode	Disable
Remote Access (Tunneling):	
Remote Access	Disable
Remote Port	2000
Remote IP Address	0.0.0.0

APPENDIX A

GLOSSARY

User of this manual should be familiar with following definitions:

ARP (Address Resolution Protocol) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address that is recognized in the local network. For example, the IP address in use today is an address that is 32-bits long. In an Ethernet local area network, however, addresses for attached devices are 48-bits long. (The physical machine address is also known as a Media Access Control or MAC address.) A table, usually called the ARP cache, is used to maintain a correlation between each MAC address and its corresponding IP address. ARP provides the protocol rules for making this correlation and providing address conversion in both directions.

Ethernet is a network protocol defined by the IEEE 802.3 standard. Ethernet-based networks use MAC Address rather than IP Address to exchange data between computers. By using ARP and adding TCP/IP support, Ethernet devices may be connected as part of the Internet. An Ethernet LAN typically uses coaxial cable or special grades of twisted pair wires. The most commonly installed Ethernet systems are called 10BASE-T and provide transmission speeds up to 10 Mbps. Devices are connected to the cable and compete for access using a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol.

IP (Internet Protocol) is the method or protocol by which data is sent from one computer to another on the Internet.

IP address (Internet Protocol address) is a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Internet.

IP Netmask is a 32-bit pattern of bits used to determine which part of the IP address is the network portion and which part is the host portion.

MAC (Media Access Control) Address is your computer's unique hardware number. When you're connected to the Internet from your computer, a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN.

Ping is a utility that tests the network connectivity. It is used to determine if the host is capable of exchanging information with another host.

Port number/Socket number is a way to identify a specific process to which an Internet or other network message is to be forwarded when it arrives at a server. It is a predefined address that serves as a route from the application to the Transport layer or from the Transport layer to the application of the TCP/IP system.

Sockets are a method for communication between a client program and a server program in a network and defined as "the endpoint in a connection." Information transferred across the Internet primarily occurs between sockets.

TCP/IP (Transmission Control Protocol/Internet Protocol) is the basic communication language or protocol of the Internet. When you are set up with direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP. TCP/IP often is used as a general term to indicate generic access to the Internet.

Appendix B

IP Address

An IP address is a unique 32-bit address assigned to a computer and includes:

- A network ID number identifying a network.
- A host ID number identifying a computer on the network.

All IP addresses have been divided into three smaller groups (classes) A, B and C

- **Class A** addresses have 8-bits of network ID and 24-bits of host ID. They can support a large number of hosts, approximately $2^{24} = 16,777,216$ computers per network.

The IP addresses range in binary from 00000001.xxxxxxxx.xxxxxxxx.xxxxxxxx
to 01111111.xxxxxxxx.xxxxxxxx.xxxxxxxx

The IP addresses range in decimal from 1.x.x.x to 127.x.x.x

Class A network ID's support a very large number of hosts.

- **Class B** addresses have 16-bits of network ID and 16-bits of host ID. They can support approximately $2^{16} = 65,536$ computers per network.

The IP addresses range in binary from 10000000 00000000.xxxxxxxx.xxxxxxxx
to 10111111 11111111.xxxxxxxx.xxxxxxxx

The IP addresses range in decimal from 128.0.x.x to 191.255.xxx.xxx

Class B network ID's support a medium number of hosts.

- **Class C** addresses have 24-bits of network ID and 8-bits of host ID. They can support approximately $2^8 = 256$ computers per network.

The IP addresses range in binary from 11000000.00000000.00000000.xxxxxxxx
to 11011111.11111111.11111111.xxxxxxxx

The IP addresses range in decimal from 192.0.0.xxx to 223.255.255.xxx

Class C network ID's support a small number of hosts.

Note The rest of the addresses are divided into two classes, D and E.
Class D networks are not assigned to the host. They are used for multicasting.
The address range from 224.x.x.x to 239.x.x.x

Class E networks are experimental or reserved addresses.
The address range from 240.x.x.x to 247.x.x.x

Appendix C

IP Netmask

IP Netmask or Subnet Mask is a 32-bit pattern of ones and zeros used to determine network portion of an IP address from the host portion of the IP address. Subnet mask is a network ID that is created by borrowing bits from host portion of IP address and using them as part of a network ID. The table below shows a default subnet mask for address Classes A, B, and C. Each bit that is set to "1" in the subnet mask corresponds to the bit in the IP address that is to be used as the network ID. Each bit that is set to "0" in the subnet mask corresponds to a bit in the IP address that is to be used as the host ID.

Address Class	Mask Binary Value	Mask Decimal Value or Dotted Notation
Class A	11111111 00000000 00000000 00000000	255.0.0.0
Class B	11111111 11111111 00000000 00000000	255.255.0.0
Class C	11111111 11111111 11111111 00000000	255.255.255.0

If your network requires more network ID's, you can extend the default subnet mask to include additional bits from the host ID. This allows for additional network ID's within the network. The table below shows some examples of subnet masks and bits moved from the hosts ID to create a new subnet.

Mask Dotted Notation	Mask Binary	Mask Bits
Class A		
255.0.0.0 (Default)	11111111 00000000 00000000 00000000	0
255.192.0.0	11111111 11000000 00000000 00000000	2
255.224.0.0	11111111 11100000 00000000 00000000	3
255.240.0.0	11111111 11110000 00000000 00000000	4
255.248.0.0	11111111 11111000 00000000 00000000	5
255.252.0.0	11111111 11111100 00000000 00000000	6
255.254.0.0	11111111 11111110 00000000 00000000	7
255.255.0.0	11111111 11111111 00000000 00000000	8
255.255.128.0	11111111 11111111 10000000 00000000	9
255.255.192.0.0	11111111 11111111 11000000 00000000	10
.....
255.255.255.252	11111111 11111111 11111111 11111100	22
Class B		
255.255.0.0 (Default)	11111111 11111111 00000000 00000000	0
255.255.192.0	11111111 11111111 11000000 00000000	2
.....
255.255.255.252	11111111 11111111 11111111 11111100	14
Class C		
255.255.255.0 (Default)	11111111 11111111 11111111 00000000	0
255.255.255.192	11111111 11111111 11111111 11000000	2
.....
255.255.255.254	11111111 11111111 11111111 11111100	6

To determine the number of valid hosts ID's remaining after subnetting, use the following equation: $2^n - 2$, where n is the number of octet digits left after the subnet mask.

Appendix D

ASCII Chart

ASCII Char	Dec	Hex	Binary No Parity	ASCII Char	Dec	Hex	Binary No parity
NUL	00	00	00000000	@	64	40	01000000
SOH	01	01	00000001	A	65	41	01000001
STX	02	02	00000010	B	66	42	01000010
ETX	03	03	00000011	C	67	43	01000011
EOT	04	04	00000100	D	68	44	01000100
ENQ	05	05	00000101	E	69	45	01000101
ACK	06	06	00000110	F	70	46	01000110
BEL	07	07	00000111	G	71	47	01000111
BS	08	08	00001000	H	72	48	01001000
HT	09	09	00001001	I	73	49	01001001
LF	10	0A	00001010	J	74	4A	01001010
VT	11	0B	00001011	K	75	4B	01001011
FF	12	0C	00001100	L	76	4C	01001100
CR	13	0D	00001101	M	77	4D	01001101
SO	14	0E	00001110	N	78	4E	01001110
SI	15	0F	00001111	O	79	4F	01001111
DLE	16	10	00010000	P	80	50	01010000
DC1	17	11	00010001	Q	81	51	01010001
DC2	18	12	00010010	R	82	52	01010010
DC3	19	13	00010011	S	83	53	01010011
DC4	20	14	00010100	T	84	54	01010100
NAK	21	15	00010101	U	85	55	01010101
SYN	22	16	00010110	V	86	56	01010110
ETB	23	17	00010111	W	87	57	01010111
CAN	24	18	00011000	X	88	58	01011000
EM	25	19	00011001	Y	89	59	01011001
SUB	26	1A	00011010	Z	90	5A	01011010
ESC	27	1B	00011011	[	91	5B	01011011
FS	28	1C	00011100	\	92	5C	01011100
GS	29	1D	00011101	]	93	5D	01011101
RS	30	1E	00011110	^	94	5E	01011110
US	31	1F	00011111	_	95	5F	01011111
SP	32	20	00100000	~	96	60	01100000
!	33	21	00100001	a	97	61	01100001
"	34	22	00100010	b	98	62	01100010
#	35	23	00100011	c	99	63	01100011
\$	36	24	00100100	d	100	64	01100100
%	37	25	00100101	e	101	65	01100101
&	38	26	00100110	f	102	66	01100110
'	39	27	00100111	g	103	67	01100111
(	40	28	00101000	h	104	68	01101000
)	41	29	00101001	i	105	69	01101001
*	42	2A	00101010	j	106	6A	01101010
+	43	2B	00101011	k	107	6B	01101011
,	44	2C	00101100	l	108	6C	01101100
-	45	2D	00101101	m	109	6D	01101101
.	46	2E	00101110	n	110	6E	01101110

Appendix D

ASCII Chart Continuation

/	47	2F	00101111	o	111	6F	01101111
0	48	30	00110000	p	112	70	01110000
1	49	31	00110001	q	113	71	01110001
2	50	32	00110010	r	114	72	01110010
3	51	33	00110011	s	115	73	01110011
4	52	34	00110100	t	116	74	01110100
5	53	35	00110101	u	117	75	01110101
6	54	36	00110110	v	118	76	01110110
7	55	37	00110111	w	119	77	01110111
8	56	38	00111000	x	120	78	01111000
9	57	39	00111001	y	121	79	01111001
:	58	3A	00111010	z	122	7A	01111010
;	59	3B	00111011	{	123	7B	01111011
<	60	3C	00111100	|	124	7C	01111100
=	61	3D	00111101	}	125	7D	01111101
>	62	3E	00111110	~	126	7E	01111110
?	63	3F	00111111	DEL	127	7F	01111111


ASCII Control Codes

ASCII Char	Dec	Hex	Ctrl Key Equiv.	Definition	ASCII Char	Dec	Hex	Ctrl Key Equiv.	Definition
NUL	00	00	Ctrl @	Null Character	DC1	17	11	Ctrl Q	Data Control 1 - XON
SOH	01	01	Ctrl A	Start of Header	DC2	18	12	Ctrl R	Data Control 2
STX	02	02	Ctrl B	Start of Text	DC3	19	13	Ctrl S	Data Control 3 - XOFF
ETX	03	03	Ctrl C	End of Text	DC4	20	14	Ctrl T	Data Control 4
EOT	04	04	Ctrl D	End of Transmission	NAK	21	15	Ctrl U	Negative Acknowledge
ENQ	05	05	Ctrl E	Inquiry	SYN	22	16	Ctrl V	Synchronous Idle
ACK	06	06	Ctrl F	Acknowledge	ETB	23	17	Ctrl W	End of Trans Block
BEL	07	07	Ctrl G	Bell	CAN	24	18	Ctrl X	Cancel
BS	08	08	Ctrl H	Back Space	EM	25	19	Ctrl Y	End of Medium
HT	09	09	Ctrl I	Horizontal Tabulation	SUB	26	1A	Ctrl Z	Substitute
LF	10	0A	Ctrl J	Line Feed	ESC	27	1B	Ctrl [	Escape
VT	11	0B	Ctrl K	Vertical Tabulation	FS	28	1C	Ctrl \	File Separator
FF	12	0C	Ctrl L	Form Feed	GS	29	1D	Ctrl]	Group Separator
CR	13	0D	Ctrl M	Carriage Return	RS	30	1E	Ctrl ^	Record Separator
SO	14	0E	Ctrl N	Shift Out	US	31	1F	Ctrl _	Unit Separator
SI	15	0F	Ctrl O	Shift In	SP	32	20		Space
DLE	16	10	Ctrl P	Data Link Escape					

PART 7

APPROVALS INFORMATION

7.1 CE APPROVALS INFORMATION

 This product conforms to the EMC directive 89/336/EEC amended by 93/68/EEC, and with the European Low Voltage Directive 72/23/EEC.

Electrical Safety EN61010-1:2001

Safety requirements for electrical equipment for measurement, control and laboratory.

Double Insulation

Pollution Degree 2

Dielectric withstand Test per 1 min

- Power to Input/Output: 2300Vac (3250Vdc)
- Power to Input/Output: 1500Vac (2120Vdc) (Low Voltage dc Power Option*)
- Power to Relays/SSR Output: 2300Vac (3250Vdc)
- Ethernet to Inputs: 1500Vac (2120Vdc)
- Isolated RS232 to Inputs: 500Vac (720Vdc)
- Isolated Analog to Inputs: 500Vac (720Vdc)
- Analog/Pulse to Inputs: No Isolation

Measurement Category I

Category I are measurements performed on circuits not directly connected to the Mains Supply (power). Maximum Line-to-Neutral working voltage is 50Vac/dc. This unit should not be used in Measurement Categories II, III, IV.

Transients Overvoltage Surge (1.2 / 50uS pulse)

- Input Power: 2500V
- Input Power: 1500V (Low Voltage dc Power Option*)
- Ethernet: 1500V
- Input/Output Signals: 500V

Note: *Units configured for external low power dc voltage, 12-36Vdc

EMC EN61326:1997 + and A1:1998 + A2:2001

Immunity and Emissions requirements for electrical equipment for measurement, control and laboratory.

- EMC Emissions Table 4, Class B of EN61326
- EMC Immunity** Table 1 of EN61326

Note: **I/O signal and control lines require shielded cables and these cables must be located on conductive cable trays or in conduits. Furthermore, the length of these cables should not exceed 30 meters

Refer to the EMC and Safety installation considerations (Guidelines) of this manual for additional information.



7.2 FCC

This device complies with Part 15, Subpart B, Class B of the FCC rules.

**Where Do I Find Everything I Need for
Process Measurement and Control?
OMEGA...Of Course!
Shop on line at omega.com**

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

**ENVIRONMENTAL
MONITORING AND CONTROL**

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

CH 13

WAGNER MODEL R2R-1
S/N H3859

MAIN OPERATOR PANEL
SEC 13

AS A MATTER OF EFFICIENCY, ALMOST ALL OF THE MACHINES ON/OFF FUNCTIONS AND SEVERAL ANALOG CONTROLS ARE BUILT INTO THE MAIN OPERATOR PANEL. WHERE NECESSARY SUCH AS THE UNWIND, REWIND, E-SPIN, EXTRUDER SETTINGS AND LASER SWEEP SETTINGS HAVE BEEN LEFT AT THE CONTROLS FOR EACH OF THOSE AREAS.

THE ATTACHED DRAWING OF THE OPERATOR PANEL SHOWS THE VARIOUS FUNCTION SWITCH LOCATIONS. THE MOST IMPORTANT FUNCTIONS SUCH AS START, STOP AND LINE SPEED CONTROLS ARE SET BY USING THE INSTRUCTIONS ON THE FOLLOWING PAGES.

DETAILED INSTRUCTIONS ON SETTING THE PID TEMPERATURE CONTROLS ARE OUTLINED IN THE OMEGA OPERATOR MANUAL AND ARE THE SAME FOR ALL 18 CHANNELS OF TEMPERATURE CONTROLS.

THE OVEN CONTROLLERS ARE SIMPLER AND ONLY REQUIRED THE USE OF THE UP/DOWN BUTTONS FOR SETTING TEMPERATURES.

THE E-SPIN TEMPERATURE AND HUMIDITY CONTROLLER SETTINGS ARE LIKEWISE DESCRIBED IN THE OMEGA HUMIDITY/TEMP HANDBOOK.

INSIDE THE MAIN OPERATOR PANEL IS WHERE MOST OF THE FUSES AND WIRING CONNECTIONS FOR THE ON/OFF FUNCTION SWITCHES. EACH TIME A CERTAIN FUNCTION IS TURNED ON, THE SWITCH WILL BE ILLUMINATED GREEN AND THE DISPLAY WILL BE LIT.

IF THE E-STOP TRIP CABLE IS ACTIVATED, THE MACHINE WILL COME TO AN IMMEDIATE STOP AND THE E-STOP BUTTON WILL BE LIT.

ONCE THE E-STOP SWITCH HAS BEEN RESET, THE ESR (EMERGENCY STOP RESET) BUTTON CAN BE PRESSED WHICH RESETS THE POWER CONTACTORS IN THE REAR POWER CABINET AND THE MACHINE CAN BE RESTARTED. IF THE STEEL BELT SHOULD TRACK OFF TO ONE SIDE AND CONTACT ONE OF THE 4 PROBE WIRES (2 AT THE UNDERSIDE OF THE E-SPIN CABINET AND 2 AT THE ENTRANCE TO THE OVENS) A BELT WARNING INDICATOR LIGHT WILL COME ON AT THE RIGHT SIDE OF THE

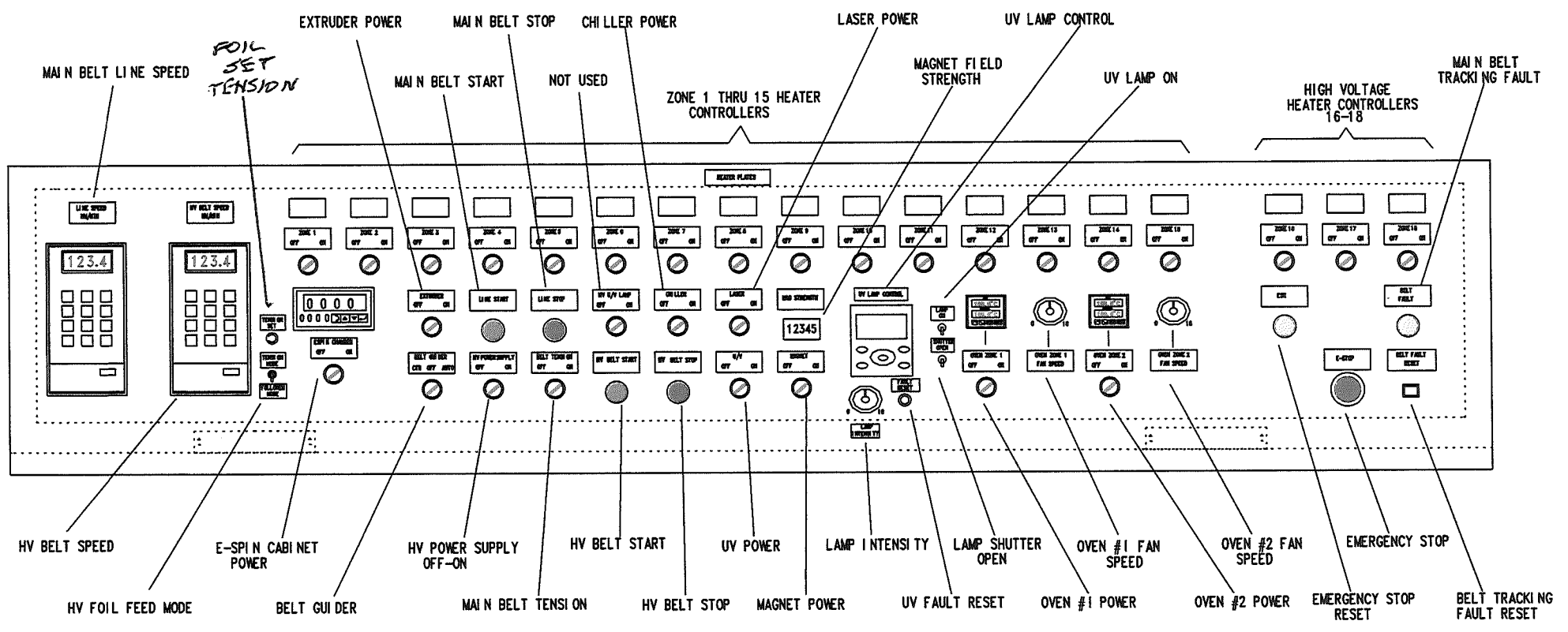
WAGNER MODEL R2R-1
S/N H3859

MAIN OPERATOR PANEL
SEC 13-2

OPERATOR PANEL. NEXT TO THIS INDICATOR IS A SMALL PUSH BUTTON LABELED BELT RESET. AFTER THE BELT POSITION ISSUE HAS BEEN CORRECTED, (USUALLY JUST A MINOR ADJUSTMENT TO ONE OF THE BELT EDGE GUIDE GAIN CONTROLS ON THE REAR OF THE MACHINE FRAME), THE RESET BUTTON WILL EXTINGUISH THE BELT ERROR LAMP AND THE LINE CAN BE STARTED AGAIN. IT MUST BE REMEMBERED THAT THE BELT ERROR CONDITION WILL STOP THE FORWARD BELT FEED IN ORDER TO PREVENT DAMAGE TO THE BELT.

THE BELT TENSION SWITCH MUST BE TURNED ON BEFORE THE BELT WILL BE ALLOWED TO MOVE. THE NORMAL BELT AIR PRESSURE IS LOCATED AT THE REAR INFEED SIDE OF THE MACHINE. AIR PRESSURE SHOULD BE BETWEEN 15 AND 30 PSI ON THE GAUGE AT THE REGULATOR.

MAIN OPERATOR PANEL



CH 1 4

WAGNER MODEL R2R-1
S/N H3859

BELT DRIVE

SEC 14

THE BELT TENSION SWITCH MUST BE TURNED ON BEFORE THE BELT WILL BE ALLOWED TO MOVE. THE NORMAL BELT AIR PRESSURE IS LOCATED AT THE REAR INFEED SIDE OF THE MACHINE. AIR PRESSURE SHOULD BE BETWEEN 30 AND 35 PSI ON THE GAUGE AT THE REGULATOR LOCATED AT THE REAR OF THE E-SPIN CABINET. THE BELT DRIVE AND STAINLESS STEEL BELT ARE SET UP IN AN ENDLESS LOOP CONFIGURATION WITH THE BELT BEING WELDED AND POLISHED AT THE WELD JOINTS.

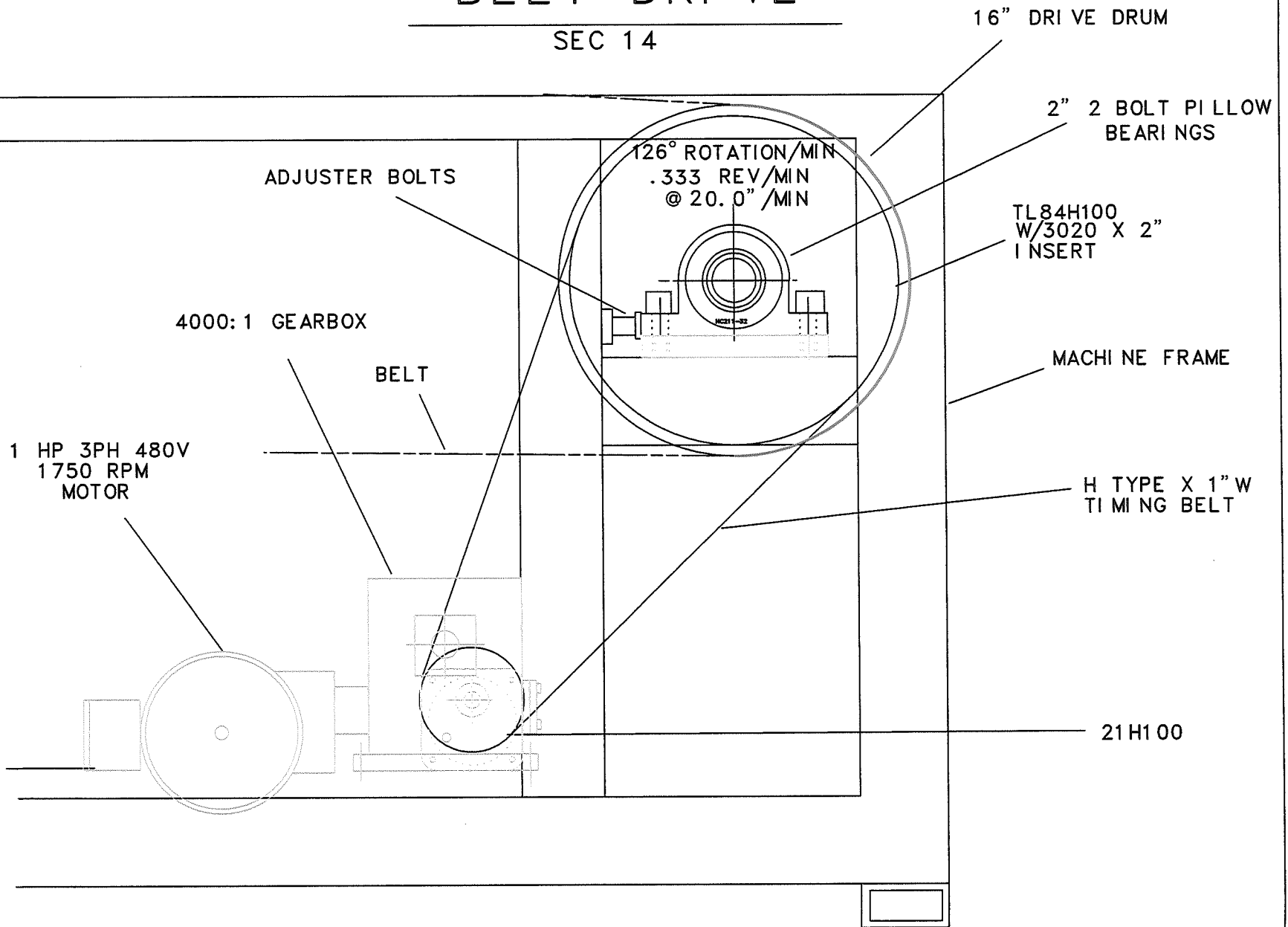
A 1HP 3 PHASE 480VOLT GEARMOTOR WITH A RATIO OF 4000 TO 1 PROVIDES STABLE SLOW SPEEDS FROM 10 THRU 500 MM/MINUTE. A 2500 PPR QUAD ENCODER WITH 6 INCH CIRCUMFERENCE RIDER WHEEL IS PLACED ON THE TOP OF THE LOWER STEEL BELT CLOSE TO THE CONTREX CONTROLLER NEAR THE OPERATORS PANEL. THE CONTROLLER SENDS A 0-10 VOLT DC SIGNAL TO THE 3 PHASE VECTOR DRIVE WHICH RUNS THE MAIN BELT DRIVE MOTOR.

START AND STOP COMMANDS ARE SENT TO THE CONTREX M-TRIM WHICH IN TURN ARE FED TO THE VECTOR DRIVE. THE E-STOP SYSTEM CONTROLS THE CONTREX WHICH IN TURN, STOPS THE DRIVE AND MOTOR.

THE MECHANICAL CONNECTION TO THE STEEL BELT CONSISTS OF THE 1 HP AC MOTOR AND GEARBOX CONNECTED TO AN H-TYPE 1" WIDE TIMING BELT. A 4:1 LARGER PULLEY IS ATTACHED TO THE DRUM SHAFT. THE DRUM SHAFT IS MOUNTED TO PILLOW BLOCK BEARINGS WITH SKEW ADJUSTERS TO KEEP THE BELT FROM TRACKING OFF THE END OF THE DRUM. ALL OF THE BELT DRIVE COMPONENTS ARE LOCATED AT THE EXIT END OF THE MACHINE SO AS TO ACT AS A "PULLING" ARRANGEMENT AS OPPOSED TO A BELT PUSHER SYSTEM. AS ALWAYS, THE BELT AND DRUMS MUST BE KEPT CLEAN AND FREE OF GRIT PARTICLES THAT COULD DAMAGE THE BELT.

BELT DRIVE

SEC 14



M-TRIM, M-DRIVE / FAX-IN HELP SHEET

DATE 5/11/18 TIME _____

ATTN: TECHNICAL SERVICE
OF: CONTREX INC.

FAX: 1-763-424-8734
PHONE: 1-800-342-4411

FROM: _____

OF: Followup

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WE ARE TRANSMITTING _____ PAGES, INCLUDING THIS SHEET.
PLEASE CALL ME _____ ASAP. _____ WHEN CONVENIENT.

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CODE

1= <u>0</u>	14= <u>2000</u>	29= <u>0</u>	60= <u>1</u>	70= <u>1</u>	80= <u>-</u>
2= <u>0</u>	15= <u>2000</u>	30= <u>250</u>	61= <u>1</u>	71= <u>6</u>	81= _____
3= <u>1000</u>	16= <u>32</u>	31= <u>250</u>	62= <u>2</u>	72= <u>2</u>	82= _____
4= <u>0.000</u>	17= <u>32</u>	32= <u>60</u>	63= <u>1</u>	73= <u>0</u>	83= _____
5= <u>50</u>	18= <u>0</u>	33= <u>2000</u>	64= <u>1</u>	74= <u>0</u>	84= _____
6= <u>100</u>	19= <u>0</u>	34= <u>34</u>	65= <u>5000</u>	75= <u>0</u>	85= <u>461</u>
10= <u>0</u>	20= <u>549</u>	35= <u>2000</u>	66= <u>2000</u>	76= <u>0</u>	86= <u>3272</u>
11= <u>2000</u>	21= <u>1.069</u>	36= <u>34</u>	67= <u>0</u>	77= <u>0</u>	87= _____
12= <u>0</u>	22= <u>549</u>	37= <u>34</u>	68= <u>100</u>	78= <u>0</u>	88= _____
13= <u>2000</u>	23= <u>549</u>	38= <u>2000</u>	69= <u>10</u>	79= <u>2</u>	99= <u>1.80</u>

THE PROBLEM BRIEFLY IS: _____

WHEN THE PROBLEM OCCURS, THE MONITOR VARIABLES ARE:

CODE

40= <u>0</u>	44= <u>0</u>	48= <u>0</u>	52= <u>3</u>	56= <u>0</u>	00= _____
41= <u>0</u>	45= <u>0</u>	49= <u>0</u>	53= <u>64</u>	57= <u>33</u>	59= <u>1</u>
42= <u>0</u>	46= <u>0</u>	50= <u>2</u>	54= <u>157</u>	58= <u>0</u>	
43= <u>0</u>	47= <u>0</u>	51= <u>1</u>	55= <u>0</u>	99= <u>1.80</u>	

THE NEXT SHEET(S) SHOWS A SKETCH OF THE SYSTEM.

M-TRIM, M-DRIVE / FAX-IN HELP SHEET

DATE 5/11/18 TIME _____

ATTN: TECHNICAL SERVICE
OF: CONTREX INC.

FAX: 1-763-424-8734
PHONE: 1-800-342-4411

FROM: _____

OF: MASTER

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THE CODES THAT ARE **DIFFERENT** THAN FACTORY DEFAULT ARE:

CODE

1= <u>-</u>	14= <u>2000</u>	29= <u>0</u>	60= <u>1</u>	70= <u>1</u>	80= _____
2= <u>0</u>	15= <u>2000</u>	30= <u>60</u>	61= <u>1</u>	71= <u>6</u>	81= _____
3= <u>1.0</u>	16= <u>64</u>	31= <u>250</u>	62= <u>2</u>	72= <u>2</u>	82= _____
4= <u>0.00</u>	17= <u>64</u>	32= <u>60</u>	63= <u>1</u>	73= <u>0</u>	83= _____
5= <u>30</u>	18= <u>0</u>	33= <u>2000</u>	64= <u>2</u>	74= <u>0</u>	84= _____
6= <u>100</u>	19= <u>0</u>	34= <u>32</u>	65= <u>4000</u>	75= <u>0</u>	85= <u>0</u>
10= <u>0</u>	20= <u>487</u>	35= <u>2000</u>	66= <u>750</u>	76= <u>0</u>	86= <u>3467</u>
11= <u>2000</u>	21= <u>1.000</u>	36= <u>2000</u>	67= <u>0</u>	77= <u>0</u>	87= _____
12= <u>0</u>	22= <u>487</u>	37= <u>2000</u>	68= <u>100</u>	78= <u>0</u>	88= _____
13= <u>2000</u>	23= <u>1.000</u>	38= <u>2000</u>	69= <u>10</u>	79= <u>2</u>	99= <u>1.10</u>

THE PROBLEM BRIEFLY IS: _____

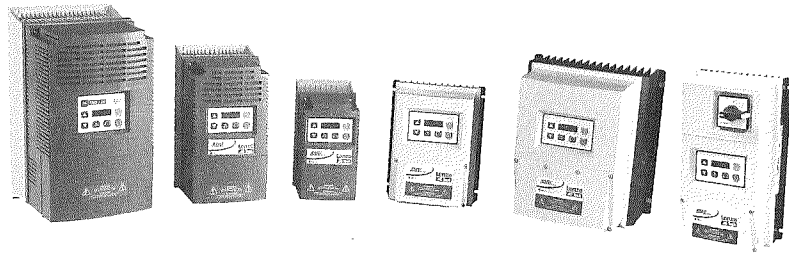
WHEN THE PROBLEM OCCURS, THE MONITOR VARIABLES ARE:

CODE

40= <u>0</u>	44= <u>0</u>	48= <u>0</u>	52= <u>3</u>	56= <u>0</u>	00= _____
41= <u>0</u>	45= <u>0</u>	49= <u>0</u>	53= <u>64</u>	57= <u>20</u>	59= <u>13</u>
42= <u>0</u>	46= <u>0</u>	50= <u>1</u>	54= <u>255</u>	58= <u>0</u>	
43= <u>0</u>	47= <u>0</u>	51= <u>1</u>	55= <u>0</u>	99= <u>1.10</u>	

THE NEXT SHEET(S) SHOWS A SKETCH OF THE SYSTEM.

Lenze
AC Tech



SMVector - Frequency Inverter
Operating Instructions

SMV
 230V 3Ø
 PID



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About These Instructions

This documentation applies to the SMV frequency inverter and contains important technical data regarding the installation, operation, and commissioning of the inverter.

These instructions are only valid for SMV frequency inverters with software revision 2.0 or higher (refer to drive nameplate, an example is shown below).

Please read these instructions in their entirety before commissioning the drive.

A	B	C	D	E	F	
		Type: ESV751N04TXB Id-No: 00000000	INPUT: 3~ (3/PE) 400/480 V 2.9/2.5 A 50-60 HZ	OUTPUT: 3~ (3/PE) 0-400/460 V 2.4/2.1 A 0.75 KW/1HP 0-500 HZ	For detailed information refer to instruction Manual: SV01	00000000000000000000 ESV751N04TXB000XX###
Made in USA Inverter SMVvector		LISTED UL SD81 US IND. CONT. EQ.	TYPE-4X INDOOR USE ONLY			

A	B	C	D	E	F
Certifications	Type	Input Ratings	Output Ratings	Hardware Version	Software Version

Scope of delivery	Important
<ul style="list-style-type: none"> 1 SMV inverter with EPM installed (see Section 4.4) 1 Operating Instructions manual 	After receipt of the delivery, check immediately whether the items delivered match the accompanying papers. Lenze AC Tech does not accept any liability for deficiencies claimed subsequently. Claim: <ul style="list-style-type: none"> visible transport damage immediately to the forwarder. visible deficiencies /incompleteness immediately to your Lenze AC Tech representative

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All information given in this documentation has been carefully selected and tested for compliance with the hardware and software described. Nevertheless, discrepancies cannot be ruled out. Lenze AC Tech does not accept any responsibility nor liability for damages that may occur. Any necessary corrections will be implemented in subsequent editions. This document is printed in the United States



Safety Information

1 Safety Information

General

Some parts of Lenze AC Tech controllers can be electrically live and some surfaces can be hot. Non-authorized removal of the required cover, inappropriate use, and incorrect installation or operation creates the risk of severe injury to personnel and/or damage to equipment.

All operations concerning transport, installation, and commissioning as well as maintenance must be carried out by qualified, skilled personnel who are familiar with the installation, assembly, commissioning, and operation of variable frequency drives and the application for which it is being used.

Installation

Ensure proper handling and avoid excessive mechanical stress. Do not bend any components and do not change any insulation distances during transport, handling, installation or maintenance. Do not touch any electronic components or contacts. This drive contains electrostatically sensitive components, which can easily be damaged by inappropriate handling. Static control precautions must be adhered to during installation, testing, servicing and repairing of this drive and associated options. Component damage may result if proper procedures are not followed.

To ensure proper operation, do not install the drive where it is subjected to adverse environmental conditions such as combustible, oily, or hazardous vapors; corrosive chemicals; excessive dust, moisture or vibration; direct sunlight or extreme temperatures.

This drive has been tested by Underwriters Laboratory (UL) and is UL Listed in compliance with the UL508C Safety Standard. This drive must be installed and configured in accordance with both national and international standards. Local codes and regulations take precedence over recommendations provided in this and other Lenze AC Tech documentation.

The SMVvector drive is considered a component for integration into a machine or process. It is neither a machine nor a device ready for use in accordance with European directives (reference machinery directive and electromagnetic compatibility directive). It is the responsibility of the end user to ensure that the machine meets the applicable standards.

Electrical Connection

When working on live drive controllers, applicable national safety regulations must be observed. The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, protective earth [PE] connection). While this document does make recommendations in regards to these items, national and local codes must be adhered to.

The documentation contains information about installation in compliance with EMC (shielding, grounding, filters and cables). These notes must also be observed for CE-marked controllers. The manufacturer of the system or machine is responsible for compliance with the required limit values demanded by EMC legislation.

Application

The drive must not be used as a safety device for machines where there is a risk of personal injury or material damage. Emergency Stops, over-speed protection, acceleration and deceleration limits, etc must be made by other devices to ensure operation under all conditions.

The drive does feature many protection devices that work to protect the drive and the driven equipment by generating a fault and shutting the drive and motor down by removing power. Mains power variances can also result in shutdown of the drive. When the fault condition disappears or is cleared, the drive can be configured to automatically restart, it is the responsibility of the user, OEM and/or integrator to ensure that the drive is configured for safe operation.

Safety Information

Explosion Proof Applications

Explosion proof motors that are not rated for inverter use lose their certification when used for variable speed. Due to the many areas of liability that may be encountered when dealing with these applications, the following statement of policy applies:

Lenze AC Tech Corporation inverter products are sold with no warranty of fitness for a particular purpose or warranty of suitability for use with explosion proof motors. Lenze AC Tech Corporation accepts no responsibility for any direct, incidental or consequential loss, cost or damage that may arise through the use of AC inverter products in these applications. The purchaser expressly agrees to assume all risk of any loss, cost or damage that may arise from such application.

Operation

Systems including controllers must be equipped with additional monitoring and protection devices according to the corresponding standards (e.g. technical equipment, regulations for prevention of accidents, etc.). The controller may be adapted to your application as described in this documentation.



DANGER!

- After the controller has been disconnected from the supply voltage, live components and power connection must not be touched immediately, since capacitors could be charged. Please observe the corresponding notes on the controller.
- Close all protective covers and doors prior to and during operation.
- Do not cycle input power to the controller more than once every two minutes.
- In SMVector models that come equipped with an optional disconnect switch; the disconnect switch is a motor service disconnect **not** an inverter service disconnect. For servicing of the inverter it is necessary to remove mains power from the inverter and wait 3 minutes before attempting to service the inverter.

Safety Notifications

All safety information given in these Operating Instructions includes a visual icon, a bold signal word and a description.



Signal Word! (characterizes the severity of the danger)

NOTE (describes the danger and informs on how to proceed)

Icon	Signal Words		
	Warning of hazardous electrical voltage	DANGER!	Warns of impending danger. Consequences if disregarded: Death or severe injuries.
	Warning of a general danger	WARNING!	Warns of potential, very hazardous situations. Consequences if disregarded: Death or severe injuries.
	Warning of hot surface and risk of burn	WARNING! Hot Surface	Warns of potential, serious situations. Labels may be on or inside the equipment to alert people that surfaces may reach dangerous temperatures.
	Warning of damage to equipment	STOP!	Warns of potential damage to material and equipment. Consequences if disregarded: Damage to the controller/drive or its environment.
	Information	NOTE	Designates a general, useful note. If observed, then using the controller/drive system is made easier.

Safety Information

Harmonics Notification in accordance with EN 61000-3-2, EN 61000-3-12:

Operation in public supply networks (Limitation of harmonic currents i.a.w. EN 61000-3-2, Electromagnetic Compatibility (EMC) Limits). Limits for harmonic current emissions (equipment input current up to 16A/phase).

Directive	Total Power connected to Mains (public supply)	Additional Measures Required for Compliance ⁽²⁾
EN 61000-3-2	< 0.5kW	with mains choke
	0.5 ... 1kW	with active filter
	> 1kW	complies without additional measures
EN 61000-3-12	16 ... 75amp	Additional measures are required for compliance with the standard

- (1) For compliance with EMC regulations, the permissible cable lengths may change.
- (2) The additional measures described only ensure that the controller meets the requirements of the EN 61000-3-2. The machine/system manufacturer is responsible for the machine's compliance with the regulations.

Safety Information in accordance with EN 61800-5-1:



DANGER! Hazard of Electrical Shock

Capacitors retain charge for approximately 180 seconds after power is removed. Allow at least 3 minutes for discharge of residual charge before touching the drive.



WARNING!

- This product can cause a d.c. current in the PE conductor. Where a residual current-operated (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM Type B is allowed on the supply side of this product.
- Leakage Current may exceed 3.5mA AC. The minimum size of the PE conductor shall comply with local safety regulations for high leakage current equipment.
- In a domestic environment, this product may cause radio interference in which case supplementary mitigation measures may be required.



NOTE

Control and communications terminals provide reinforced insulation when the drive is connected to a power system rated up to 300V rms between phase to ground (PE) and the applied voltage on Terminals 16 and 17 is less than 150VAC between phase and ground.

Control and communications terminals provide basic insulation when the drive is connected to a power system rated up to 300V between phase to ground (PE) and the applied voltage on terminals 16 and 17 is less than 250 VAC between phase phase and ground (PE).

Safety Information in accordance with UL:

Note for UL approved system with integrated controllers: UL warnings are notes which apply to UL systems. The documentation contains special information about UL.



Warnings!

- Suitable for use on a circuit capable of delivering not more than 200,000 rms symmetrical amperes, at the maximum voltage rating marked on the drive.
- Use minimum 75 °C copper wire only.
- Shall be installed in a pollution degree 2 macro-environment.
- NEMA 1 (IP31) models shall be installed in a pollution degree 2 macro-environment.

Torque Requirements (in accordance with UL) are listed in section 3.2.1, Power Connections.



Technical Data

2 Technical Data

2.1 Standards and Application Conditions

Conformity	CE	Low Voltage (2006/95/EC) & EMC (2004/108/EC) Directives
Approvals	UL508C	Underwriters Laboratories -Power Conversion Equipment
Input voltage phase imbalance	≤ 2%	
Humidity	≤ 95% non-condensing	
Temperature range	Transport	-25 ... +70°C
	Storage	-20 ... +70°C
	Operation	-10 ... +55°C (with 2.5%/°C current derating above +40°C)
Installation height	0 - 4000m a.m.s.l. (with 5%/1000 m current derating above 1000m a.m.s.l.)	
Vibration resistance	acceleration resistant up to 1.0g	
Earth leakage current	> 3.5 mA to PE	
Max Permissible Cable Length ⁽¹⁾	≤ 4.0 Hp (3.0 kW)	30 meters shielded, 60 meters un-shielded
	⇒ 5.0 Hp (3.7 kW)	50 meters shielded, 100 meters un-shielded.
Enclosure	IP31/NEMA 1	IP65/NEMA 4X
Protection measures against	short circuit, earth fault, phase loss, over voltage, under voltage, motor stalling, over temperature, motor overload	
Compliance with EN 61000-3-2 Requirements ⁽²⁾	< 0.5kW	with mains choke
	0.5 ... 1kW	with active filter
	> 1kW	without additional measures
Compliance with EN 61000-3-12 Requirements ⁽²⁾	16 ... 75amp	Additional measures required for compliance with EN 61000-3-12

Operation in public supply networks (Limitation of harmonic currents i.a.w. EN 61000-3-2, Electromagnetic Compatibility (EMC) Limits). Limits for harmonic current emissions (equipment input current up to 16A/phase).

- (1) The stated cable lengths are permissible at default carrier frequencies (refer to parameter P166).
- (2) The additional measures described only ensure that the controller meets the requirements of the EN 61000-3-2. The machine/system manufacturer is responsible for the machine's compliance with the regulations.

Technical Data



2.2 SMV Type Number Designation

The table herein describes the Type numbering designation for the SMVector Inverter models.

	ESV	152	NO	2	T	X	B
Electrical Products in the SMVector Series							
Power Rating in kW:							
251 = 0.25kW (0.33HP)			113 = 11.0kW (15HP)				
371 = 0.37kW (0.5HP)			153 = 15.0kW (20HP)				
751 = 0.75kW (1HP)			183 = 18.5kW (25HP)				
112 = 1.1kW (1.5HP)			223 = 22.0kW (30HP)				
152 = 1.5kW (2HP)							
222 = 2.2kW (3HP)							
302 = 3.0kW (4HP)							
402 = 4.0kW (5HP)							
552 = 5.5kW (7.5HP)							
752 = 7.5kW (10HP)							
Installed I/O & Communication Module(s):							
C_ = CANopen (Available all models)				The " _ " blank can be:			
D_ = DeviceNet (Available all models)				0 = Standard Keypad			
E_ = Ethernet/IP, ModBus TCP/IP (Avail all models)				N = No Keypad (NEMA 4X / IP65 only)			
R_ = RS-485 / ModBus /Lecom (Avail all models)							
P_ = ProfiBus-DP (Available all models)							
N_ = No Communications installed (Non-IP20)							
Input Voltage:							
1 = 120 VAC (doubler output) or 240 VAC							
2 = 240 VAC							
4 = 400/480 VAC							
6 = 600 VAC							
Input Phase:							
S = Single Phase Input only							
Y = Single or Three Phase Input							
T = Three Phase Input only							
Input Line Filter							
F = Integral EMC Filter							
L = Integral EMC Filter and Integrated Line Disconnect (NEMA 4X/IP65 Models only)							
M = Integrated Line Disconnect (NEMA 4X/IP65 Models only)							
X = No EMC Filter/No Line Disconnect							
Enclosure:							
B = NEMA 1/IP31; Indoor only							
C = NEMA 4X/IP65; Indoor only; Convection cooled							
D = NEMA 4X/IP65; Indoor only; Fan cooled							
E = NEMA 4X/IP65; Indoor/Outdoor; Convection cooled							
F = NEMA 4X/IP65; Indoor/Outdoor; Fan cooled							



NOTE

Prior to installation make sure the enclosure is suitable for the end-use environment
Variables that influence enclosure suitability include (but are not limited to) temperature, airborne contaminants, chemical concentration, mechanical stress and duration of exposure (sunlight, wind, precipitation).



Technical Data

2.3 Ratings

120V / 240VAC Models

Mains = 120V Single Phase (1/N/PE) (90...132V), 240V Single Phase (2/PE) (170...264V); 48...62Hz									
Type	Power		Mains Current		Output Current		Heat Loss (Watts)		
	Hp	kW	120V A	240V A	Cont (I _n) A	Max I %	N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter
ESV251--1S--	0.33	0.25	6.8	3.4	1.7	200	24		
ESV371--1S--	0.5	0.37	9.2	4.6	2.4	200	32	32	
ESV751--1S--	1	0.75	16.6	8.3	4.2	200	52	41	
ESV112--1S--	1.5	1.1	20	10.0	6.0	200	74	74	

NOTES:

Output Current: The Output Current Maximum (%) is a percentage of the Output Current Continuous Amps (In) rating and is adjustable in parameter P171.

240VAC Models

Mains = 240V Single Phase (2/PE) (170...264V); 48...62Hz								
Type	Power		Mains Current	Output Current		Heat Loss (Watts)		
	Hp	kW	240V A	Cont (I _n) A	Max I %	N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter
ESV251--2S--	0.33	0.25	3.4	1.7	200	20		
ESV371--2S--	0.5	0.37	5.1	2.4	200			30
ESV751--2S--	1	0.75	8.8	4.2	200			42
ESV112--2S--	1.5	1.1	12.0	6.0	200			63
ESV152--2S--	2	1.5	13.3	7.0	200			73
ESV222--2S--	3	2.2	17.1	9.6	200			97

240V Single Phase (2/PE) (170...264V), 240V Three Phase (3/PE) (170...264V); 48...62Hz									
Type	Power		Mains Current		Output Current		Heat Loss (Watts)		
	Hp	kW	1~ (2/PE) A	3~ (3/PE) A	Cont (I _n) A	Max I %	N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter
ESV371--2Y--	0.5	0.37	5.1	2.9	2.4	200	27	26	
ESV751--2Y--	1	0.75	8.8	5.0	4.2	200	41	38	
ESV112--2Y--	1.5	1.1	12.0	6.9	6.0	200	64	59	
ESV152--2Y--	2	1.5	13.3	8.1	7.0	200	75	69	
ESV222--2Y--	3	2.2	17.1	10.8	9.6	200	103	93	

ESV371 N02 YXB



Technical Data

240V Three Phase (3/PE) (170...264V); 48...62Hz									
Type	Power		Mains Current	Output Current		Heat Loss (Watts)			
	Hp	kW	240V A	Cont (I _n) A	Max I %	N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter	
ESV112--2T--	1.5	1.1	6.9	6	200	64			
ESV152--2T--	2	1.5	8.1	7	200	75			
ESV222--2T--	3	2.2	10.8	9.6	200	103			
ESV402--2T--	5	4.0	18.6	16.5	200	154	139		
ESV552--2T--	7.5	5.5	26	23	200	225	167		
ESV752--2T--	10	7.5	33	29	200	274	242		
ESV113--2T--	15	11	48	42	180	485	468		
ESV153--2T--	20	15	59	54	180	614	591		

NOTES:

Output Current: The Output Current Maximum (%) is a percentage of the Output Current Continuous Amps (In) rating and is adjustable in parameter P171.

400...480VAC Models

400 ... 480V Three Phase (3/PE) (400V: 340...440V), (480V: 340...528V); 48...62Hz											
Type	Power		Mains Current		Output Current				Heat Loss (Watts)		
	Hp	kW	400V A	480V A	Cont (I _n) A		Max I %		N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter
					400V	480V	400V	480V			
ESV371--4T--	0.5	0.37	1.7	1.5	1.3	1.1	175	200	23	21	25
ESV751--4T--	1	0.75	2.9	2.5	2.4	2.1	175	200	37	33	37
ESV112--4T--	1.5	1.1	4.2	3.6	3.5	3.0	175	200	48	42	46
ESV152--4T--	2	1.5	4.7	4.1	4.0	3.5	175	200	57	50	54
ESV222--4T--	3	2.2	6.1	5.4	5.5	4.8	175	200	87	78	82
ESV302--4T--	4	3.0	8.3	7.0	7.6	6.3	175	200			95
ESV402--4T--	5	4.0	10.6	9.3	9.4	8.2	175	200	128	103	111
ESV552--4T--	7.5	5.5	14.2	12.4	12.6	11.0	175	200	178	157	165
ESV752--4T--	10	7.5	18.1	15.8	16.1	14.0	175	200	208	190	198
ESV113--4T--	15	11	27	24	24	21	155	180	418	388	398
ESV153--4T--	20	15	35	31	31	27	155	180	493	449	459
ESV183--4T--	25	18.5	44	38	39	34	155	180	645	589	600
ESV223--4T--	30	22	52	45	46	40	155	180	709	637	647

NOTES:

Output Current: The Output Current Maximum (%) is a percentage of the Output Current Continuous Amps (In) rating and is adjustable in parameter P171.

For 400...480 VAC models, the output current maximum (%) in the 400V column is used when P107 = 0

For 400...480 VAC models, the output current maximum (%) in the 480V column is used when P107 = 1

ESV371 N04 YXB/000 RX 1542



Technical Data

600VAC Models

Type	600V Three Phase (3/PE) (425...660V); 48...62Hz							
	Power		Mains Current	Output Current		Heat Loss (Watts)		
	Hp	kW	A	Cont (I _n) A	Max I %	N1/IP31	N4X/IP65 No filter	N4X/IP65 W/ filter
ESV751--6T--	1	0.75	2	1.7	200	37	31	
ESV152--6T--	2	1.5	3.2	2.7	200	51	43	
ESV222--6T--	3	2.2	4.4	3.9	200	68	57	
ESV402--6T--	5	4	6.8	6.1	200	101	67	
ESV552--6T--	7.5	5.5	10.2	9	200	148	116	
ESV752--6T--	10	7.5	12.4	11	200	172	152	
ESV113--6T--	15	11	19.7	17	180	380	356	
ESV153--6T--	20	15	25	22	180	463	431	
ESV183--6T--	25	18.5	31	27	180	560	519	
ESV223--6T--	30	22	36	32	180	640	592	

NOTES:

Output Current: The Output Current Maximum (%) is a percentage of the Output Current Continuous Amps (In) rating and is adjustable in parameter P171.



STOP!

- For installations above 1000m a.m.s.l., derate I_n by 5% per 1000m, do not exceed 4000m a.m.s.l.
- Operation above 40°C, derate I_n by 2.5% per °C, do not exceed 55°C.

Output Current (In) derating for Carrier Frequency (P166) for NEMA 1 (IP31) Models:

- If P166=2 (8 kHz), derate I_n to 92% of drive rating
- If P166=3 (10 kHz), derate I_n to 84% of drive rating

Output Current (In) derating for Carrier Frequency (P166) for NEMA 4X (IP65) Models:

- If P166=1 (6 kHz), derate I_n to 92% of drive rating
- If P166=2 (8 kHz), derate I_n to 84% of drive rating
- If P166=3 (10 kHz), derate I_n to 76% of drive rating

Installation



3 Installation

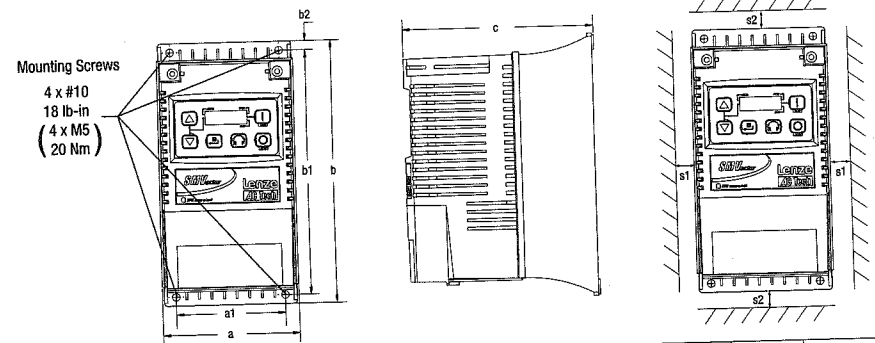
3.1 Dimensions and Mounting



WARNING!

Drives must not be installed where subjected to adverse environmental conditions such as: combustible, oily, or hazardous vapors; corrosive chemicals; excessive dust, moisture or vibration; direct sunlight or extreme temperatures.

3.1.1 NEMA 1 (IP31)



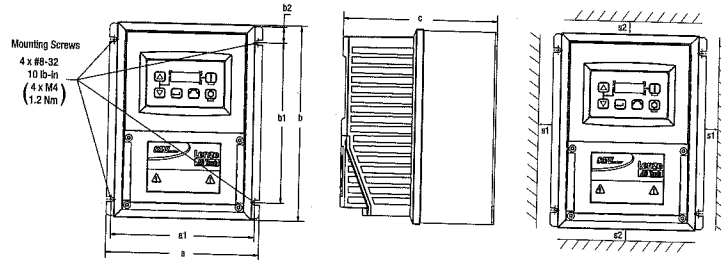
Type	a in (mm)	a1 in (mm)	b in (mm)	b1 in (mm)	b2 in (mm)	c in (mm)	s1 in (mm)	s2 in (mm)	m lb (kg)
G1 ESV251-----B; ESV371-----B ESV751-----B	3.90 (99)	3.12 (79)	7.48 (190)	7.00 (178)	0.24 (6)	4.35 (111)	0.6 (15)	2.0 (50)	2.0 (0.9)
G2 ESV112-----B; ESV152-----B ESV222-----B	3.90 (99)	3.12 (79)	7.52 (191)	7.00 (178)	0.26 (7)	5.45 (138)	0.6 (15)	2.0 (50)	2.8 (1.3)
G3 ESV402-----B	3.90 (99)	3.12 (79)	7.52 (191)	7.00 (178)	0.30 (8)	5.80 (147)	0.6 (15)	2.0 (50)	3.2 (1.5)
H1 ESV552-----B; ESV752-----B	5.12 (130)	4.25 (108)	9.83 (250)	9.30 (236)	0.26 (7)	6.30 (160)	0.6 (15)	2.0 (50)	6.0 (2.0)
J1 ESV113-----B; ESV153-----B ESV183-----B; ESV223-----B	6.92 (176)	5.75 (146)	12.50 (318)	11.88 (302)	0.31 (8)	8.09 (205)	0.6 (15)	2.0 (50)	13.55 (6.15)

Conduit Hole Dimensions	Type	N in (mm)	P in (mm)	P1 in (mm)	Q in (mm)	S in (mm)
	G1	1.84 (47)	1.93 (49)	.70 (18)	1.00 (25)	.88 (22)
	G2	1.84 (47)	3.03 (77)	.70 (18)	1.00 (25)	.88 (22)
	G3	1.84 (47)	3.38 (86)	.70 (18)	1.00 (25)	.88 (22)
	H1	2.46 (62)	3.55 (90)	.13 (3)	1.38 (35)	1.13 (29) .88 (22)
	J1	3.32 (84)	4.62 (117)	.73 (19)	1.40 (36)	1.31 (33)
						.88 (22)



Installation

3.1.2 NEMA 4X (IP65)



	Type	a	a1	b	b1	b2	c	s1	s2	m
		in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	lb (kg)
R1	ESV371N01SX_ ; ESV751N01SX_ ; ESV371N02YX_ ; ESV751N02YX_ ; ESV371N04TX_ ; ESV751N04TX_ ; ESV751N06TX_ ; ESV371N02SF_ ; ESV751N02SF_ ; ESV371N04TF_ ; ESV751N04TF_ ;	6.28 (160)	5.90 (150)	8.00 (203)	6.56 (167)	0.66 (17)	4.47 (114)	2.00 (51)	2.00 (51)	3.6 (1.63)
	ESV112N01SX_ ; ESV112N02YX_ ; ESV152N02YX_ ; ESV112N04TX_ ; ESV152N04TX_ ; ESV222N04TX_ ; ESV152N06TX_ ; ESV222N06TX_ ; ESV112N02SF_ ; ESV152N02SF_ ; ESV112N04TF_ ; ESV152N04TF_ ; ESV222N04TF_ ; ESV302N04TF_ ;	6.28 (160)	5.90 (150)	8.00 (203)	6.56 (167)	0.66 (17)	6.31 (160)	2.00 (51)	2.00 (51)	5.9 (2.68)
	ESV222N02YX_ ; ESV222N02SF_ ;	7.12 (181)	6.74 (171)	8.00 (203)	6.56 (167)	0.66 (17)	6.77 (172)	2.00 (51)	2.00 (51)	7.1 (3.24)
	ESV552N02TX_ ; ESV752N02TX_ ; ESV752N04TX_ ; ESV752N06TX_ ; ESV752N04TF_ ;	8.04 (204)	7.56 (192)	10.00 (254)	8.04 (204)	0.92 (23)	8.00 (203)	4.00 (102)	4.00 (102)	10.98 (4.98)
	ESV402N02TX_ ; ESV402N04TX_ ; ESV552N04TX_ ; ESV402N06TX_ ; ESV552N06TX_ ; ESV402N04TF_ ; ESV552N04TF_ ;	8.96 (228)	8.48 (215)	10.00 (254)	8.04 (204)	0.92 (23)	8.00 (203)	4.00 (102)	4.00 (102)	11.58 (5.25)
W1	ESV113N02TX_ ; ESV153N02TX_ ; ESV113N04TX_ ; ESV153N04TX_ ; ESV113N04TF_ ; ESV153N04TF_ ; ESV113N06TX_ ; ESV153N06TX_ ; ESV183N04TX_ ; ESV183N04TF_ ; ESV183N06TX_ ;	9.42 (240)	8.94 (228)	14.38 (366)	12.54 (319)	0.92 (24)	9.45 (241)	4.00 (102)	4.00 (102)	22.0 (10.0)
	ESV223N04TX_ ; ESV223N04TF_ ; ESV223N06TX_ ;	9.42 (240)	8.94 (228)	18.5 (470)	16.66 (424)	0.92 (24)	9.45 (241)	4.00 (102)	4.00 (102)	25.5 (11.6)

- = Last digit of part number:

C = N4X Indoor (convection cooled)

E = N4X In/Outdoor (convection cooled)

~ = Last digit of part number: D = N4X Indoor (fan cooled)

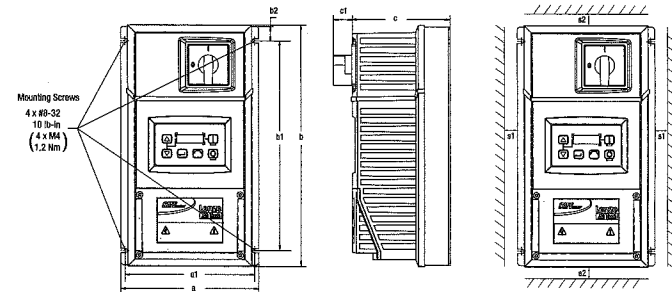
F = N4X In/Outdoor (fan cooled)

Conduit Hole Dimensions		Type	N	P	Q	S	S1
			in (mm)	in (mm)	in (mm)	in (mm)	in (mm)
		R1	3.14 (80)	2.33 (59)	1.50 (38)	.88 (22)	n/a
		R2	3.14 (80)	4.18 (106)	1.50 (38)	.88 (22)	n/a
		S1	3.56 (90)	4.63 (118)	1.50 (38)	.88 (22)	n/a
		T1	4.02 (102)	5.00 (127)	1.85 (47)	1.06 (27)	n/a
		V1	4.48 (114)	5.00 (127)	1.85 (47)	1.06 (27)	n/a
		W1	4.71 (120)	5.70 (145)	2.00 (51)	1.375 (35)	1.125 (28)
		X1	4.71 (120)	5.70 (145)	2.00 (51)	1.375 (35)	1.125 (28)



Installation

3.1.3 NEMA 4X (IP65) with Disconnect Switch



	Type	a	a1	b	b1	b2	c	c1	s1	s2	m
		in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	lb (kg)
AA1	ESV371N01SM_ ; ESV371N02YM_ ; ESV371N02SL_ ; ESV371N04TM_ ; ESV371N04TL_ ; ESV371N06TM_ ; ESV751N01SM_ ; ESV751N02YM_ ; ESV751N02SL_ ; ESV751N04TM_ ; ESV751N04TL_ ; ESV751N06TM_ ;	6.28 (160)	5.90 (150)	10.99 (279)	9.54 (242)	0.66 (17)	4.47 (114)	.86 (22)	2.00 (51)	2.00 (51)	4.7 (2.13)
	ESV112N01SM_ ; ESV112N02YM_ ; ESV112N02SL_ ; ESV112N04TM_ ; ESV112N04TL_ ; ESV152N02YM_ ; ESV152N02SL_ ; ESV152N04TM_ ; ESV152N04TL_ ; ESV152N06TM_ ; ESV222N04TM_ ; ESV222N04TL_ ; ESV222N06TM_ ; ESV302N04TL_ ;	6.28 (160)	5.90 (150)	10.99 (279)	9.54 (242)	0.66 (17)	6.31 (160)	.86 (22)	2.00 (51)	2.00 (51)	7.9 (3.58)
AD1	ESV222N02SL_ ; ESV222N02YM_ ;	7.12 (181)	6.74 (171)	10.99 (279)	9.54 (242)	0.66 (17)	6.77 (172)	.86 (22)	2.00 (51)	2.00 (51)	9.0 (4.08)
AB1	ESV552N02TM_ ; ESV752N02TM_ ; ESV752N04TM_ ; ESV752N06TM_ ; ESV752N04TL_ ;	8.04 (204)	7.56 (192)	13.00 (330)	11.04 (280)	0.92 (23)	8.00 (203)	.86 (22)	4.00 (102)	4.00 (102)	13.9 (6.32)
	ESV402N02TM_ ; ESV402N04TM_ ; ESV552N04TM_ ; ESV402N06TM_ ; ESV552N06TM_ ; ESV402N04TL_ ; ESV552N04TL_ ;	8.96 (228)	8.48 (215)	13.00 (330)	11.04 (280)	0.92 (23)	8.04 (204)	.86 (22)	4.00 (102)	4.00 (102)	14.7 (6.66)
AE1	ESV113N04TM_ ; ESV153N04TM_ ; ESV113N06TM_ ; ESV153N06TM_ ;	9.42 (240)	8.94 (228)	14.38 (366)	12.54 (319)	0.92 (24)	9.45 (241)	0.75 (20)	4.00 (102)	4.00 (102)	23.0 (10.4)
AF1	ESV113N02TM_ ; ESV153N02TM_ ; ESV113N04TL_ ; ESV153N04TL_ ; ESV183N04TL_ ; ESV223N04TL_ ; ESV183N06TM_ ; ESV223N06TM_ ;	9.42 (240)	8.94 (228)	18.5 (470)	16.66 (424)	0.92 (24)	9.45 (241)	1.7 (44)	4.00 (102)	4.00 (102)	28.5 (12.9)

- = Last digit of part number: C = N4X Indoor (convection cooled)

~ = Last digit of part number: D = N4X Indoor (fan cooled)

Conduit Hole Dimensions		Type	N	P	Q	S	S1
			in (mm)	in (mm)	in (mm)	in (mm)	in (mm)
		AA1	3.14 (80)	2.33 (59)	1.50 (38)	.88 (22)	n/a
		AA2	3.14 (80)	4.18 (106)	1.50 (38)	.88 (22)	n/a
		AD1	3.56 (90)	4.63 (118)	1.50 (38)	.88 (22)	n/a
		AB1	4.02 (102)	5.00 (127)	1.85 (47)	1.06 (27)	n/a
		AC1	4.48 (114)	5.00 (127)	1.85 (47)	1.06 (27)	n/a
		AE1	4.71 (120)	5.70 (145)	2.00 (51)	1.375 (35)	1.125 (28)
		AF1	4.71 (120)	5.70 (145)	2.00 (51)	1.375 (35)	1.125 (28)



Installation

3.2 Electrical Installation

3.2.1 Power Connections



DANGER! Hazard of electrical shock!
Circuit potentials up to 600 VAC are possible. Capacitors retain charge after power is removed. Disconnect power and wait at least three minutes before servicing the drive.

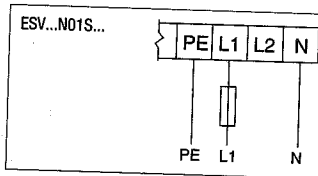


STOP!

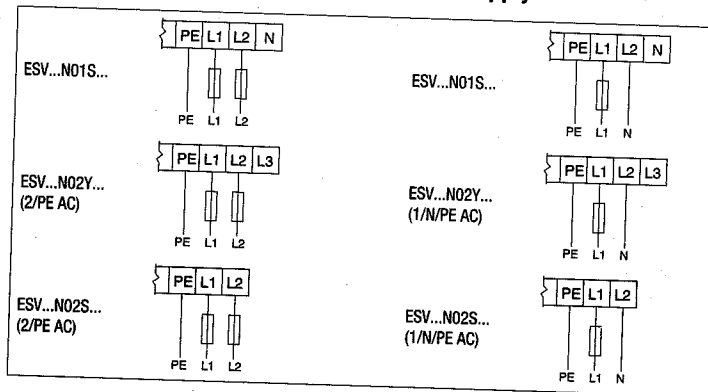
- Verify mains voltage before connecting to drive.
- Do not connect mains power to the output terminals (U,V,W)! Severe damage to the drive will result.
- Do not cycle mains power more than once every two minutes. Damage to the drive will result.

Mains and Motor Terminations		
Type	Torque	Strip Length
<5HP	12 lb-in (1.3 Nm)	0.25 in (6mm)
ESV552xx2T, ESV752xx2T, ESV113xx4/6, ESV153xx4/6, ESV183xx6, ESV223xx6	16 lb-in (1.8 Nm)	0.25 in (6mm)
ESV552xx4Txx, ESV752xx4Txx, ESV552xx6Txx, ESV752xx6Txx	12 lb-in (1.3Nm)	0.25 in (6mm)
ESV113xx2xxx, ESV153xx2xxx, ESV183xx4xxx, ESV223xx4xxx	24 lb-in (2.7 Nm)	0.25 in (6mm)
Torque: N4X/IP65 Door Screws		
N4X/IP65	6-7 lb-in (0.67-0.79 Nm)	0.25 in (6mm)

3.2.1.1 Mains Connection to 120VAC Single-Phase Supply

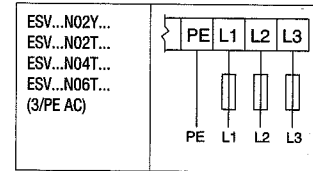


3.2.1.2 Mains Connection to 240VAC Single-Phase Supply

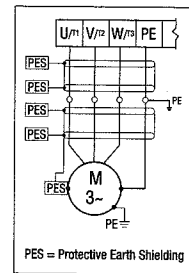


Installation

3.2.1.3 Mains Connection to Three-Phase Supply



3.2.1.4 Motor Connection



WARNING!

If the cable connection between the drive and the motor has an in-line contactor or circuit breaker then the drive must be stopped prior to opening/closing the contacts. Failure to do so may result in Overcurrent trips and/or damage to the inverter.



WARNING!

Leakage current may exceed 3.5 mA AC. The minimum size of the protective earth (PE) conductor shall comply with local safety regulations for high leakage current equipment.

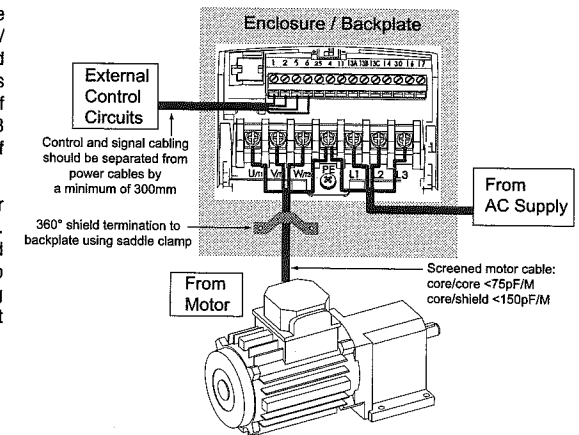
3.2.1.5 Installation Recommendations for EMC Compliance

For compliance with EN 61800-3 or other EMC standards, motor cables, line cables and control or communications cables must be shielded with each shield/screen clamped to the drive chassis. This clamp is typically located at the conduit mounting plate.

The EMC requirements apply to the final installation in its entirety, not to the individual components used. Because every installation is different, the recommended installation should follow these guidelines as a minimum. Additional equipment (such as ferrite core absorbers on power conductors) or alternative practices may be required to meet conformance in some installations.

Motor cable should be low capacitance (core/core <75pF/m, core/shield <150pF/m). Filtered drives can meet the class A limits of EN 55011 and EN 61800-3 Category 2 with this type of motor cable up to 10 meters.

NOTE: Refer to Appendix A for recommended cable lengths. Any external line filter should have its chassis connected to the drive chassis by mounting hardware or with the shortest possible wire or braid.

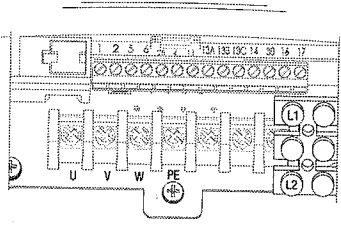




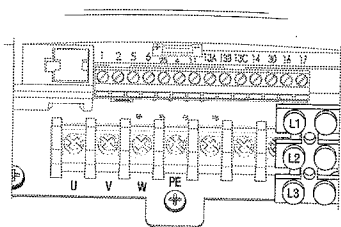
Installation

3.2.1.6 NEMA 4X (IP65) Input Terminal Block

For NEMA 4X (IP65) models with integrated EMC filter and/or integrated line disconnect, the input terminal block is located on the right-hand side of the SMV inverter in the NEMA 4 X (IP65) enclosure. The single and three phase models are illustrated herein. Refer to paragraph 3.2.3 Control Terminals for pin out information.



Single Phase (2/PE)
With Filter and/or integrated line disconnect



Three Phase (3/PE)
With Filter and/or integrated line disconnect

3.2.2 Fuses/Cable Cross-Sections



NOTE

Observe local regulations. Local codes may supersede these recommendations

Type	Recommendations				
	Fuse	Miniature circuit breaker ⁽¹⁾	Fuse ⁽²⁾ or Breaker ⁽³⁾ (N. America)	Input Power Wiring (L1, L2, L3, PE)	
				[mm ²]	[AWG]
120V 1~ (1/N/PE)	ESV251N01SXB	M10 A	C10 A	10 A	1.5 14
	ESV371N01SXB, ESV371N01SX*	M16 A	C16 A	15 A	2.5 14
	ESV751N01SXB, ESV751N01SX*	M25 A	C25 A	25 A	4 10
	ESV112N01SXB, ESV112N01SX*	M32 A	C32 A	30 A	4 10
240V 1~ (2/PE)	ESV251N01SXB, ESV251N02SXB, ESV371N01SXB, ESV371N02YXB, ESV371N02SF*	M10 A	C10 A	10 A	1.5 14
	ESV751N01SXB, ESV751N02YXB, ESV751N02SF*	M16 A	C16 A	15 A	2.5 14
	ESV112N02YXB, ESV112N02SFC, ESV112N01SXB, ESV112N01SX*	M20 A	C20 A	20 A	2.5 12
	ESV152N02YXB, ESV152N02SF*	M25 A	C25 A	25 A	2.5 12
	ESV222N02YXB, ESV222N02SF*	M32 A	C32A	30 A	4 10
	ESV371N02YXB, ESV751N02YXB, ESV371N02Y_*, ESV751N02Y_*	M10 A	C10 A	10 A	1.5 14
240V 3~ (3/PE)	ESV112N02YXB, ESV152N02YXB, ESV112N02YXB, ESV152N02YXB, ESV112N02Y_*, ESV152N02Y_*	M16 A	C16 A	12 A	1.5 14
	ESV222N02YXB, ESV222N02YXB, ESV222N02YX*	M20 A	C20 A	20 A	2.5 12
	ESV402N02YXB, ESV402N02T_*	M32 A	C32 A	30 A	4.0 10
	ESV552N02YXB, ESV552N02T_~	M40 A	C40 A	35 A	6.0 8
	ESV752N02YXB, ESV752N02T_~	M50 A	C50 A	45 A	10 8
	ESV113N02YXB, ESV113N02T_~	M80 A	C80 A	80 A	16 6
	ESV153N02YXB, ESV153N02T_~	M100 A	C100 A	90 A	16 4

Installation



Type	Recommendations				
	Fuse	Miniature circuit breaker ⁽¹⁾	Fuse ⁽²⁾ or Breaker ⁽³⁾ (N. America)	Input Power Wiring (L1, L2, L3, PE)	
				[mm ²]	[AWG]
400V or 480V 3~(3/PE)	ESV371N04TXB ...ESV222N04TXB ESV371N04T_* ...ESV222N04T_* ESV371N04TF* ...ESV222N04TF*	M10 A	C10 A	10 A	1.5 14
	ESV302N04T_*	M16 A	C16 A	15 A	2.5 14
	ESV402N04TXB, ESV402N04T_*	M16 A	C16 A	20 A	2.5 14
	ESV552N04TXB, ESV552N04T_*	M20 A	C20 A	20 A	2.5 14
	ESV752N04TXB, ESV752N04T_~	M25 A	C25 A	25 A	4.0 10
400V or 480V 3~(3/PE)	ESV113N04TXB, ESV113N04T_~	M40 A	C40 A	40 A	4 8
	ESV153N04TXB, ESV153N04T_~	M50 A	C50 A	50 A	10 8
	ESV183N04TXB, ESV183N04T_~	M63 A	C63A	70 A	10 6
	ESV223N04TXB, ESV223N04T_~	M80 A	C80 A	80 A	16 6
	ESV751N06TXB ...ESV222N06TXB ESV751N06T_* ...ESV222N06T_*	M10 A	C10 A	10 A	1.5 14
600V 3~(3/PE)	ESV402N06TXB, ESV402N06T_*	M16 A	C16 A	12 A	1.5 14
	ESV552N06TXB, ESV552N06T_*	M16 A	C16 A	15 A	2.5 14
	ESV752N06TXB, ESV752N06T_~	M20 A	C20 A	20 A	2.5 12
	ESV113N06TXB, ESV113N06TX_~	M32 A	C32 A	30 A	4 10
	ESV153N06TXB, ESV153N06TX_~	M40 A	C40 A	40 A	4 8
	ESV183N06TXB, ESV183N06TX_~	M50 A	C50 A	50 A	6 8
	ESV223N06TXB, ESV223N06TX_~	M63 A	C63 A	60 A	10 8

(1) Installations with high fault current due to large supply mains may require a type D circuit breaker.
(2) UL Class CC or T fast-acting current-limiting type fuses, 200,000 AIC, preferred. Bussman KTK-R, JJJ or JJS or equivalent.
(3) Thermomagnetic type breakers preferred.

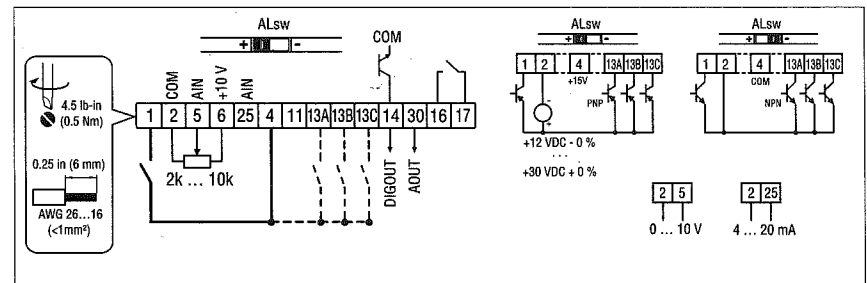
- 11th digit of part number: F = Integral EMC Filter
L = Integral EMC Filter and Integrated Line Disconnect (NEMA 4X/IP65 Models only)
M = Integrated Line Disconnect (NEMA 4X/IP65 Models only)
X = No EMC Filter/No Line Disconnect
C = N4X Indoor only (convection cooled)
E = N4X Indoor/Outdoor (convection cooled)
- Last digit of part number: D = N4X Indoor only (fan cooled)
F = N4X Indoor/Outdoor (fan cooled)

Observe the following when using Ground Fault Circuit Interrupters (GFCIs):

- Installation of GFCI only between supplying mains and controller.
- The GFCI can be activated by:
 - capacitive leakage currents between the cable screens during operation (especially with long, screened motor cables)
 - connecting several controllers to the mains at the same time
 - RFI filters

3.2.3 Control Terminals

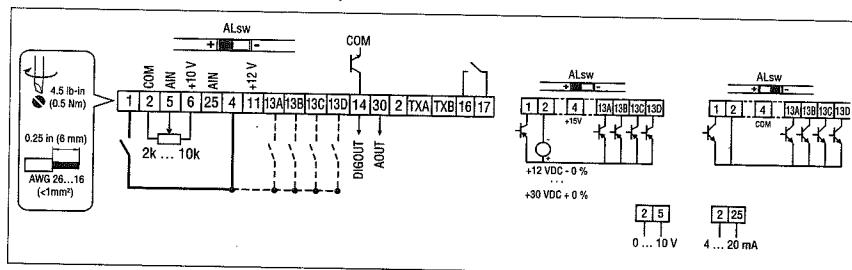
Control Terminal Strip for 0.33 - 10 HP (0.25 - 7.5 kW):





Installation

Control Terminal Strip for 15HP (11 kW) and Greater Drives:



NOTE

Control and communications terminals provide basic insulation when the drive is connected to a power system rated up to 300V between phase to ground (PE) and the applied voltage on terminals 16 and 17 is less than 250 VAC between phase and ground (PE).

Terminal	Description	Important
1	Digital Input: Start/Stop	input resistance = 4.3kΩ
2	Analog Common	
5	Analog Input: 0...10 VDC	input resistance: >50 kΩ
6	Internal DC supply for speed pot	+10 VDC, max. 10 mA
25	Analog Input: 4...20 mA	input resistance: 250Ω
4	Digital Reference/Common	+15 VDC / 0 VDC, depending on assertion level
11	Internal DC supply for external devices	+12 VDC, max. 50 mA
13A	Digital Input: Configurable with P121	input resistance = 4.3kΩ
13B	Digital Input: Configurable with P122	
13C	Digital Input: Configurable with P123	
13D*	Digital Input: Configurable with P124	
14	Digital Output: Configurable with P142, P144	DC 24 V / 50 mA; NPN
30	Analog Output: Configurable with P150...P155	0...10 VDC, max. 20 mA
2*	Analog Common	
TXA*	RS485 TxA	
TXB*	RS485 TxB	
16	Relay output: Configurable with P140, P144	AC 250 V / 3 A
17		DC 24 V / 2 A ... 240 V / 0.22 A, non-inductive

* = Terminal is part of the terminal strip for the 15-30HP (11-22 kW) Models only.

Assertion level of digital inputs

The digital inputs can be configured for active-high or active-low by setting the Assertion Level Switch (ALSw) and P120. If wiring to the drive inputs with dry contacts or with PNP solid state switches, set the switch and P120 to "High" (+). If using NPN devices for inputs, set both to "Low" (-). Active-high (+) is the default setting.

HIGH = +12 ... +30 V

LOW = 0 ... +3 V



NOTE

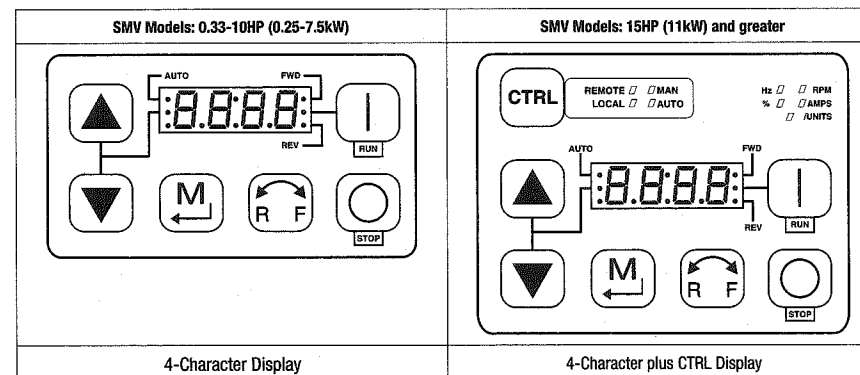
An F_{RL} fault will occur if the Assertion Level switch (ALSw) position does not match the parameter P120 setting and P100 or any of the digital inputs (P121...P124) is set to a value other than 0.

Commissioning



4 Commissioning

4.1 Local Keypad & Display



Display	START BUTTON
	In Local Mode (P100 = 0, 4, 6), this button will start the drive.
	Stops the drive, regardless of which mode the drive is in. WARNING! When JOG is active, the STOP button will not stop the drive!
	ROTATION In Local Mode (P100 = 0, 4, 6), this selects the motor rotation direction: - The LED for the present rotation direction (FWD or REV) will be on - Press R/F; the LED for the opposite rotation direction will blink - Press M within 4 seconds to confirm the change - The blinking direction LED will turn on, and the other LED will turn off When rotation direction is changed while the drive is running, the commanded direction LED will blink until the drive is controlling the motor in the selected direction.
	MODE Used to enter/exit the Parameter Menu when programming the drive and to enter a changed parameter value.
	UP AND DOWN BUTTONS Used for programming and can also be used as a reference for speed, PID setpoint, or torque setpoint. When the ▲ and ▼ buttons are the active reference, the middle LED on the left side of the display will be on.



Commissioning

Display	INDICATING LEDs (on 4-character display)
	FWD LED: Indicate the present rotation direction is forward. Refer to ROTATION description above.
	REV LED: Indicate the present rotation direction is reverse. Refer to ROTATION description above.
	AUTO LED: Indicates that the drive has been put into Auto mode from one of the TB13 inputs (P121...P124 set to 1...7). Also indicates that PID mode is active (if enabled).
	RUN LED: Indicates that the drive is running.
	▲▼ LED: Indicates that the ▲▼ are the active reference.
	NOTE If the keypad is selected as the auto reference (P121...P124 is 6) and the corresponding TB-13 input is closed, the AUTO LED and ▲▼ LEDs will both be on.
FUNCTIONS THAT FOLLOW ARE APPLICABLE TO SMV DRIVES 15HP (11kW) AND GREATER	
	CTRL The CTRL pushbutton selects the start and speed reference control sources for the drive. Press mode button to accept the new control mode selection.
CTRL LEDs	START CONTROL
	[LOCAL] [MAN] Keypad P101 Settings
	[LOCAL] [AUTO] Keypad Terminal 13x Settings
	[REMOTE] [MAN] Terminal Strip P101 Settings
	[REMOTE] [AUTO] Terminal Strip Terminal 13x Settings
If P100 = 6 the CTRL button is used to toggle start control between the terminal strip [REMOTE] and the keypad [LOCAL]	- REM/LOC LED indicating the present start control source is ON - Press [CTRL]; the LED for other start control source will blink - Press [M] within 4 sec to confirm the change - Blinking LED will turn ON (the other LED will turn OFF)
If P113 = 1 the CTRL button is used to toggle reference control between the TB-13x setup [AUTO] and P101 [MANUAL]	- AUT/MAN LED indicating present reference control is ON - Press [CTRL]; the other reference control will blink - Press [M] within 4 sec to confirm change - Blinking LED will turn ON (the other LED will turn OFF)
If P100 = 6 and P113 = 1, it is possible to change the start and reference control sources at the same time	

Commissioning



Display	START CONTROL
	The REMOTE/LOCAL LEDs indicate the current start control source. If the start control source is a remote keypad or the network, then both LEDs will be OFF.
	REFERENCE CONTROL
	The AUTO/MANUAL LEDs indicate the current reference control source.
	IF P113 = 0 or 2, the AUTO/MANUAL LEDs will match the AUTO LED on the 4-character display. IF P113 = 0 and no AUTO reference has been setup on the terminal strip, the MANUAL LED will turn ON and the AUTO LED will turn OFF.
	IF P113 = 1, the AUTO/MANUAL LEDs show the commanded reference control source as selected by the [CTRL] button. If the [CTRL] button is used to set the reference control source to AUTO but no AUTO reference has been setup on the terminal strip, reference control will follow P101 but the AUTO LED will remain ON.
	UNITS LEDES
	HZ: current display value is in Hz
	%: current display value is in %
	RPM: current display value is in RPM
	AMPS: current display value is in Amps
	/UNITS current display value is a per unit (i.e./sec, /min, /hr, etc.)
	In Speed mode, if P178 = 0 then HZ LED will be ON. If P178 > 0, the Units LEDs follow the setting of P177 when the drive is in run (non-programming) mode.
	In Torque mode, the HZ LED will be ON when the drive is in run (non-programming) mode.
	In Pid mode, the Units LEDs follow the setting of P203 when the drive is in run (non-programming) mode.
	If P179 > 0, the Units LEDs will show the unit of the diagnostic parameter that is being displayed.

4.2 Drive Display and Modes of Operation

Speed Mode Display

In the standard mode of operation, the drive frequency output is set directly by the selected reference (keypad, analog reference, etc.). In this mode, the drive display will show the drive's output frequency.

PID Mode Display

When the PID mode is enabled and active, the normal run display shows the actual PID setpoint. When PID mode is not active, the display returns to showing the drive's output frequency.

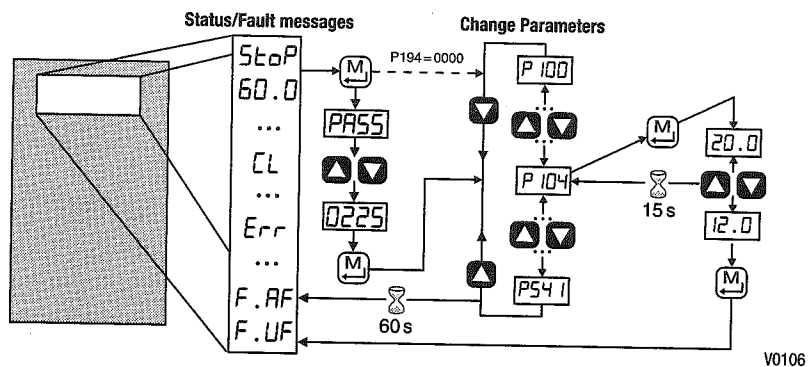
Torque Mode Display

When the drive is operating in Vector Torque mode, the normal run display shows the drive's output frequency.



Commissioning

4.3 Parameter Setting

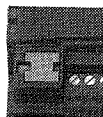


4.4 Electronic Programming Module (EPM)

The EPM contains the drives operational memory. Parameter settings are stored in the EPM and setting changes are made to the "User settings" in the EPM.

An optional EPM Programmer (model EEP11RA) is available that allows:

- An EPM to be copied directly to another EPM.
- An EPM to be copied to the memory of the EPM Programmer.
- Stored files can be modified in the EPM Programmer.
- Stored files can be copied to another EPM.



EPM Module
in SMV Drive

As the EPM Programmer is battery operated, parameter settings can be copied to an EPM and inserted into a drive without power being applied to the drive. This means that the drive will be fully operational with the new settings on the next application of power.

Additionally, when the drives parameter settings are burned into an EPM with the EPM Programmer, the settings are saved in two distinct locations; the "User settings" and the "OEM default settings". While the User settings can be modified in the drive, the OEM settings cannot. Thus, the drive can be reset not only to the "factory" drive default settings (shown in this manual), but can be set to the Original Machine settings as programmed by the OEM.

While the EPM can be removed for copying or to use in another drive, it must be installed for the drive to operate (a missing EPM will trigger an F.F.1 fault)



Commissioning

4.5 Parameter Menu

4.5.1 Basic Setup Parameters

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P 100	Start Control Source	0	0 Local Keypad 1 Terminal Strip 2 Remote Keypad Only 3 Network Only 4 Terminal Strip or Local Keypad 5 Terminal Strip or Remote Keypad 6 CTRL button select	Use RUN button on front of drive to start Use start/stop circuit wired into the terminal strip. Refer to section 3.2.3 Use RUN button on optional Remote Keypad to start Start command must come from network (Modbus, CANopen, etc) Requires optional communication module (refer to the network module documentation). Must also set one of the TB-13 inputs to 9 (Network Enable); see P121...P124 Allows start control to be switched between terminal strip and local keypad using one of the TB-13 inputs. See note below. Allows start control to be switched between terminal strip and optional remote keypad using one of the TB-13 inputs. See Note below Allows start control to be switched between terminal strip and local keypad using the CTRL button. NOTE: P100 Selection 6 is applicable to SMV 15HP (11kW) and greater models only.
WARNING! P100 = 0 disables TB-1 as a STOP input! STOP circuitry may be disabled if parameters are reset back to defaults (see P199)				
NOTE • P100 = 4, 5: To switch between control sources, one of the TB-13 inputs (P121...P124) must be set to 08 (Control Select); TB-13x OPEN (or not configured): Terminal strip control TB-13x CLOSED: Local (P100 = 4) or Remote (P100 = 5) keypad • P100 = 0, 1, 4, 6: Network can take control if P121...P124 = 9 and the corresponding TB-13x input is CLOSED. • The STOP button on the front of the drive is always active except in JOG mode. • TB-1 is an active STOP input if P100 is set to a value other than 0. • An F.AL fault will occur if the Assertion Level switch (ALsw) position does not match the P120 setting and P100 is set to a value other than 0.				
P 101	Standard Reference Source	0	0 Keypad (Local or Remote) 1 0-10 VDC 2 4-20 mA 3 Preset #1 4 Preset #2 5 Preset #3 6 Network	Selects the default speed or torque reference when no Auto Reference is selected using the TB-13 inputs.



Commissioning

Code No.	Name	Possible Settings			IMPORTANT
		Default	Selection		
P 102	Minimum Frequency	0.0	0.0 (Hz)	P103	<ul style="list-style-type: none"> P102, P103 are active for all speed references When using an analog speed reference, also see P160, P161
P 103	Maximum Frequency	60.0	7.5 (Hz)	500	
<p>NOTE</p> <ul style="list-style-type: none"> P103 cannot be set below Minimum Frequency (P102) To set P103 above 120 Hz: <ul style="list-style-type: none"> Scroll up to 120 Hz; display shows <i>H.Fr</i> (flashing). Release ▲ button and wait one second. Press ▲ button again to continue increasing P103. 					
<p>WARNING! Consult motor/machine manufacturer before operating above rated frequency. Overspeeding the motor/machine may cause damage to equipment and injury to personnel!</p>					
P 104	Acceleration Time 1	20.0	0.0 (s)	3600	<ul style="list-style-type: none"> P104 = time of frequency change from 0 Hz to P167 (base frequency) P105 = time of frequency change from P167 to 0 Hz For S-ramp accel/decel, adjust P106
P 105	Deceleration Time 1	20.0	0.0 (s)	3600	
<p>EXAMPLE: IF P103 = 120 Hz, P104 = 20.0 s and P167 (base frequency) = 60 Hz; then the rate of frequency change from 0 Hz to 120 Hz = 40.0 s</p>					
P 106	S-Ramp Integration Time	0.0	0.0 (s)	50.0	<ul style="list-style-type: none"> P106 = 0.0: Linear accel/decel ramp P106 > 0.0: Adjusts S-ramp curve for smoother ramp
P 107 ⁽¹⁾	Line Voltage Selection	1*	0 Low (120, 200, 400, 480VAC) 1 High (120, 240, 480, 600VAC)		* The default setting is 1 for all drives except when using "reset 50" (Parameter P199, selection 4) with 480V models. In this case, the default setting is 0.
P 108	Motor Overload	100	30 (%)	100	P108 = $\frac{\text{motor current rating}}{\text{SMV output rating}} \times 100$ Example: if motor = 3amps and SMV = 4amps, then P108 = 75%
<p>NOTE Do not set above rated motor current as listed on the motor dataplate. The motor thermal overload function of the SMV is UL approved as a motor protection device. If the line power is cycled, the motor thermal state is reset to cold state. Cycling power after an overload fault could result in significantly reducing the motor life.</p>					
P 109	Motor Overload Type	0	0 Speed Compensation 1 No Speed Compensation		

(1) Any changes to this parameter will not take effect until the drive is stopped

Commissioning



Code No.	Name	Possible Settings		IMPORTANT
		Default	Selection	
P 110	Start Method	0	0 Normal	<ul style="list-style-type: none"> Drive will automatically start when power is applied. When start command is applied, drive will apply DC braking according to P174, P175 prior to starting the motor Drive will automatically restart after faults, or when power is applied. Combines settings 2 and 3 Drive will automatically restart after faults, or when power is applied. After 3 failed attempts, drive will Auto Restart with DC brake. P110 = 5: Performs speed search, starting at Max Frequency (P103) P110 = 6: Performs speed search, starting at the last output frequency prior to faulting or power loss If P111 = 0, a flying START is performed when a start command is applied.
			1 Start on Power-up	
			2 Start with DC Brake	
			3 Auto Restart	
			4 Auto Restart with DC Brake	
			5 Flying Start/Restart #1	
<p>NOTE</p> <ul style="list-style-type: none"> P110 = 0, 2: Start command must be applied at least 2 seconds after power-up; <i>F.LF</i> fault will occur if start command is applied too soon. P110 = 1, 3...6: For automatic start/restart, the start source must be the terminal strip and the start command must be present. P110 = 2, 4...6: If P175=999.9, dc braking will be applied for 15s. P110 = 3...6: Drive will attempt 5 restarts; if all restart attempts fail, drive displays <i>LC</i> (fault lockout) and requires manual reset. P110 = 5, 6: If drive cannot catch the spinning motor, drive will trip into <i>F.rF</i> fault. 				
<p>WARNING! Automatic starting/restarting may cause damage to equipment and/or injury to personnel! Automatic starting/restarting should only be used on equipment that is inaccessible to personnel.</p>				
P 111	Stop Method	0	0 Coast	<ul style="list-style-type: none"> Drive's output will shut off immediately upon a stop command, allowing the motor to coast to a stop The drive's output will shut off and then the DC Brake will activate (refer to P174, P175) The drive will ramp the motor to a stop according to P105 or P126. The drive will ramp the motor to 0 Hz and then the DC Brake will activate (refer to P174, P175)
			1 Coast with DC Brake	
			2 Ramp	
	3 Ramp with DC Brake			
P 112	Rotation	0	0 Forward Only	If PID mode is enabled, reverse direction is disabled (except for Jog).
			1 Forward and Reverse	



Commissioning

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P 113	Auto/Manual Control	0	0 Terminal Strip Control	The reference is dictated by the settings and state of the TB-13x terminals. If no AUTO reference has been setup on the terminal strip then reference control is dictated by P101.
			1 Auto/Manual (CTRL button select)	Allows the reference to be switched between auto and manual using the CTRL pushbutton on the drive keypad. If the CTRL pushbutton has selected AUTO reference but no AUTO reference has been setup on the terminal strip, then reference control is dictated by P101.
			2 Manual Control Only	Reference is dictated by P101 regardless of any AUTO source that may be selected by the TB-13x terminals.
		NOTE P113 is applicable to SMV 15HP (11kW) and greater models only.		



Commissioning

4.5.2 I/O Setup Parameters

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P 120	Assertion Level	2	1 Low 2 High	P120 and the Assertion Level switch must both match the desired assertion level unless P100, P121...P124 are all set to 0. Otherwise an F.A.L. fault will occur.
P 121	TB-13A Input Function	0	0 None	Disables input
P 122	TB-13B Input Function		1 AUTO Reference: 0-10 VDC	For frequency mode, see P160...P161, For PID mode, see P204...P205, For vector torque mode, see P330
			2 AUTO Reference: 4-20 mA	For frequency mode see P131...P137, For PID mode, see P231...P233, For torque mode see, P331...P333
P 123	TB-13C Input Function		* 13D: 3 = Reserved	
P 124	TB-13D* Input Function		4 AUTO Reference: MOP Up	• Normally open: Close input to increase or decrease speed, PID or torque setpoint. • MOP Up is not active while in STOP
			5 AUTO Reference: MOP Down	
			6 AUTO Reference: Keypad	
			7 AUTO Reference: Network	
			8 Control Select	Use when P100 = 4, 5 to switch between terminal strip control and local or remote keypad control.
			9 Network Enable	Required to start the drive through the network.
			10 Reverse Rotation	Open = Forward Closed = Reverse
			11 Start Forward	
			12 Start Reverse	Refer to Note for typical circuit
			13 Run Forward	Refer to Note for typical circuit
14 Run Reverse				
15 Jog Forward	Jog Forward speed = P134			
16 Jog Reverse	Jog Reverse speed = P135 Active even if P112 = 0			
17 Accel/Decel #2	Refer to P125, P126			
18 DC Brake	Refer to P174; close input to override P175			
19 Auxiliary Ramp to Stop	Normally closed: Opening input will ramp drive to STOP according to P127, even if P111 is set to Coast (0 or 1).			
20 Clear Fault	Close to reset fault			
21 External Fault F_EF	Normally closed circuit; open to trip			
22 Inverse External Fault F_EF	Normally open circuit; close to trip			
		WARNING! Jog overrides all STOP commands! To stop the drive while in Jog mode, the Jog input must be deactivated or a fault condition induced.		



Commissioning

Code		Possible Settings		IMPORTANT																																		
No.	Name	Default	Selection																																			
<p>NOTE</p> <ul style="list-style-type: none"> When input is activated, settings 1...7 override P101 When TB-13A...TB-13D are configured for Auto References other than MOP, TB-13D overrides TB-13C, TB-13C overrides TB-13B and TB-13B overrides TB-13A. Any other Auto Reference will have priority over MOP. Settings 10...14 are only valid in Terminal Strip mode (P100 = 1, 4, 5, 6) If Start/Run/Jog Forward and Start/Run/Jog Reverse are both activated, drive will STOP If Jog input is activated while the drive is running, the drive will enter Jog mode; when Jog input is deactivated, drive will STOP An <i>F_FL</i> fault will occur if the Assertion Level switch (ALsw) position does not match the P120 setting and any of the digital inputs (P121...P124) are set to a value other than 0. An <i>F_LL</i> fault will occur under the following conditions: <ul style="list-style-type: none"> TB-13A...TB-13D settings are duplicated (each setting, except 0 and 3, can only be used once) One input is set to "MOP Up" and another is not set to "MOP Down", or vice-versa. One input is set to 10 and another input is set to 11...14. One input is set to 11 or 12 and another input is set for 13 or 14. Typical control circuits are shown below: <ul style="list-style-type: none"> If any input is set to 10, 12 or 14, P112 must be set to 1 for Reverse action to function. <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Run / Stop with Direction P121 = 10</p> </div> <div style="text-align: center;"> <p>Start Forward / Start Reverse P121 = 11, P122 = 12</p> </div> <div style="text-align: center;"> <p>Run Forward / Run Reverse P121 = 13, P122 = 14</p> </div> </div>																																						
P 125	Acceleration Time 2	20.0	0.0	{s}	3600	<ul style="list-style-type: none"> Selected using TB-13A...TB-13D (P121...P124 = 17) For S-ramp accel/decel, adjust P106 																																
P 126	Deceleration Time 2	20.0	0.0	{s}	3600																																	
P 127	Deceleration Time for Auxiliary Ramp to Stop	20.0	0.0	{s}	3600		<ul style="list-style-type: none"> Selected using TB-13A...TB-13D (P121...P124 = 19). For S-ramp accel/decel, adjust P106 Once executed, this ramp time has priority over P105 and P126. 																															
P 131	Preset Speed #1	0.0	0.0	{Hz}	500	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>PRESET SPEED</th> <th>13A</th> <th>13B</th> <th>13C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>X</td> <td>--</td> <td>--</td> </tr> <tr> <td>2</td> <td>--</td> <td>X</td> <td>--</td> </tr> <tr> <td>3</td> <td>--</td> <td>--</td> <td>X</td> </tr> <tr> <td>4</td> <td>X</td> <td>X</td> <td>--</td> </tr> <tr> <td>5</td> <td>X</td> <td>--</td> <td>X</td> </tr> <tr> <td>6</td> <td>--</td> <td>X</td> <td>X</td> </tr> <tr> <td>7</td> <td>X</td> <td>X</td> <td>X</td> </tr> </tbody> </table>	PRESET SPEED	13A	13B	13C	1	X	--	--	2	--	X	--	3	--	--	X	4	X	X	--	5	X	--	X	6	--	X	X	7	X	X	X
PRESET SPEED	13A	13B	13C																																			
1	X	--	--																																			
2	--	X	--																																			
3	--	--	X																																			
4	X	X	--																																			
5	X	--	X																																			
6	--	X	X																																			
7	X	X	X																																			
P 132	Preset Speed #2	0.0	0.0	{Hz}	500																																	
P 133	Preset Speed #3	0.0	0.0	{Hz}	500																																	
P 134	Preset Speed #4	0.0	0.0	{Hz}	500																																	
P 135	Preset Speed #5	0.0	0.0	{Hz}	500																																	
P 136	Preset Speed #6	0.0	0.0	{Hz}	500																																	
P 137	Preset Speed #7	0.0	0.0	{Hz}	500																																	



Commissioning

Code		Possible Settings		IMPORTANT	
No.	Name	Default	Selection		
P 140	Relay Output TB-16, 17	0	<ul style="list-style-type: none"> 0 None 1 Run 2 Reverse 3 Fault 4 Inverse Fault 5 Fault Lockout 6 At Speed 7 Above Preset Speed #6 8 Current Limit 9 Follower Loss (4-20 mA) 10 Loss of Load 11 Local Keypad Control Active 12 Terminal Strip Control Active 13 Remote Keypad Control Active 14 Network Control Active 15 Standard Reference Active 16 Auto Reference Active 17 Sleep Mode Active 18 PID Feedback < Min. Alarm 19 Inverse PID Feedback < Min. Alarm 20 PID Feedback > Max Alarm 21 Inverse PID Feedback > Max Alarm 22 PID Feedback within Min/Max Alarm range 23 PID Feedback outside Min/Max Alarm range 24 Reserved 25 Network Activated 	<ul style="list-style-type: none"> Disables the output Energizes when the drive is running Energizes when reverse rotation is active De-energizes when the drive trips, or power is removed Energizes when the drive trips P110 = 3...6: De-energizes if all restart attempts fail Energizes when output frequency = commanded frequency Energizes when output frequency > P136 Energizes when motor current = P171 Energizes when 4-20 mA signal falls below 2 mA Energizes when motor load drops below P145; Refer to P146 also Energizes when the selected source is active for start control Energizes when P101 reference is active Energizes when Auto Reference is activated using TB-13 input; refer to P121...P124 Refer to P240...P242 Energizes when PID feedback signal < P214 De-energizes when PID feedback signal < P214 Energizes when PID feedback signal > P215 De-energizes when PID feedback signal > P215 Energizes when PID feedback signal is within the Min/Max Alarm range; refer to P214, P215 Energizes when PID feedback signal is outside the Min/Max Alarm range; refer to P214, P215 Requires optional communication module (refer to the network module documentation). 	
P 142	TB-14 Output	0	<ul style="list-style-type: none"> 0...23 (same as P140) 24 Dynamic Braking 25 Network Activated 	<ul style="list-style-type: none"> For use with Dynamic Braking option Requires optional communication module (refer to the network module documentation). 	



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Code		Possible Settings			IMPORTANT																
No.	Name	Default	Selection																		
P 144	Digital Output Inversion		<table border="1"> <tr> <td>P144</td> <td>Invert P142</td> <td>Invert P140</td> </tr> <tr> <td>0</td> <td>NO</td> <td>NO</td> </tr> <tr> <td>1</td> <td>NO</td> <td>YES</td> </tr> <tr> <td>2</td> <td>YES</td> <td>NO</td> </tr> <tr> <td>3</td> <td>YES</td> <td>YES</td> </tr> </table>		P144	Invert P142	Invert P140	0	NO	NO	1	NO	YES	2	YES	NO	3	YES	YES	Used to invert the selections for P140 (Relay Output) and P142 (TB-14 Output). EXAMPLE: When P140 = 6 (AT SPEED), the relay is energized when output frequency = commanded frequency. If P144=1 or 3, then P140 is inverted (INVERSE AT SPEED) and the relay is energized when the output frequency does not equal the command frequency.	
			P144	Invert P142	Invert P140																
0	NO	NO																			
1	NO	YES																			
2	YES	NO																			
3	YES	YES																			
<p>NOTE Inverting P140 or P142 when the parameter is set to NONE (0) will result in the output being energized continuously.</p> <p>NOTE For SMVector drives rated at 0.33 to 10 HP (0.25 to 7.5 kW), P144 is only available with software versions 3.0 and higher (refer to P501).</p>																					
P 145	Loss of Load Threshold	0	0	{%}	200	P140, P142 = 10: Output will energize if motor load falls below the P145 value longer than the P146 time															
P 146	Loss of Load Delay	0.0	0.0	{s}	240.0																
P 150	TB-30 Output	0	0	None	2-10 VDC signal can be converted to 4-20 mA with a total circuit impedance of 500 Ω Requires optional communication module (refer to the network module documentation).																
			1	0-10 VDC Output Frequency																	
			2	2-10 VDC Output Frequency																	
			3	0-10 VDC Load																	
			4	2-10 VDC Load																	
			5	0-10 VDC Torque																	
			6	2-10 VDC Torque																	
			7	0-10 VDC Power (kW)																	
			8	2-10 VDC Power (kW)																	
			9	Network Controlled																	
P 152	TB-30 Scaling: Frequency	60.0	3.0	{Hz}	2000	If P150 = 1 or 2, sets the frequency at which output equals 10 VDC															
P 153	TB-30 Scaling: Load	200	10	{%}	500	If P150 = 3 or 4, sets the Load (as a percent of drive current rating) at which output equals 10 VDC.															
P 154	TB-30 Scaling: Torque	100	10	{%}	1000	If P150 = 5 or 6, sets the Torque (as a percent of motor rated torque) at which output equals 10 VDC															
P 155	TB-30 Scaling: Power (kW)	1.0	0.1	{kW}	200.0	If P150 = 7 or 8, sets the power at which output equals 10 VDC															

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4.5.3 Advanced Setup Parameters

Code		Possible Settings			IMPORTANT	
No.	Name	Default	Selection			
P 160	Speed at Minimum Signal	0.0	-999.0	{Hz}	1000	
			P 161	Speed at Maximum Signal	60.0		-999.0	{Hz}	1000
<p>NOTE</p> <ul style="list-style-type: none"> P160 sets the output frequency at 0% analog input P161 sets the output frequency at 100% analog input P160 or P161 < 0.0 Hz: For scaling purposes only; does not indicate opposite direction! P160 > P161: Drive will react inversely to analog input signal 					V011	
P 162	Analog Input Filter	0.01	0.00	{s}	10.00	Adjusts the filter on the analog inputs (TB-5 and TB-25) to reduce the effect of signal noise
P 163	TB-25 Loss Action	0	0 No Action		<ul style="list-style-type: none"> Selects the reaction to a loss of the 4-20 mA signal at TB-25. Signal is considered lost if it falls below 2 mA Digital outputs can also indicate a loss of 4-20 mA signal; see P140, P142 	
			1 Fault F _{FoL} 2 Go to Preset when TB-25 is: Speed reference: P137 PID feedback source: P137 PID setpoint reference: P233 Torque reference: P333			
P 166	Carrier Frequency	See Notes	0	4 kHz	<ul style="list-style-type: none"> As carrier frequency is increased, motor noise is decreased Observe derating in section 2.3 Automatic shift to 4 kHz at 120% load NEMA 4X (IP65) Models: Default = 0 (4kHz) NEMA 1 (IP31) Models: Default = 1 (6kHz) 	
			1	6 kHz		
			2	8 kHz		
			3	10 kHz		
P 167 ⁽¹⁾	Base Frequency	60.0	25.0	{Hz}	1500	
P 168	Fixed Boost		0.0	{%}	30.0	
<p>NOTE</p> <ul style="list-style-type: none"> P167 = rated motor frequency for standard applications P168 = default setting depends on drive rating 					V0112	
P 169	Accel Boost	0.0	0.0	{%}	20.0	Accel Boost is only active during acceleration
P 170	Slip Compensation	0.0	0.0	{%}	10.0	Increase P170 until the motor speed no longer changes between no load and full load conditions.

(1) Any changes to this parameter will not take effect until the drive is stopped



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Code		Possible Settings			IMPORTANT
No.	Name	Default	Selection		
P 170	Current Limit	Max I	30 (%)	Max I	<ul style="list-style-type: none"> When the limit is reached, the drive displays CL (Current Limit), and either the acceleration time increases or the output frequency decreases. Digital outputs can also indicate when the limit is reached; see P140, P142. Refer to section 2.3 for the maximum output current Max I (%)
P 174	DC Brake Voltage	0.0	0.0 (%)	30.0	Setting is a percent of the nominal DC bus voltage.
P 175	DC Brake Time	0.0	0.0 (s)	999.9	<p>NOTE CONFIRM MOTOR SUITABILITY FOR USE WITH DC BRAKING</p> <p>DC Brake voltage (P174) is applied for the time specified by P175 with the following exceptions:</p> <ul style="list-style-type: none"> If P111=1, 3 and P175=999.9 the brake voltage will be applied continuously until a run or fault condition occurs. If P110=2, 4...6 and P175=999.9, brake voltage will be applied for 15s If P121...P124=18 and the corresponding TB-13 input is CLOSED, brake voltage will be applied until the TB-13 input is OPENED or a fault condition occurs.
P 177	Speed Units	0	0 Hz 1 RPM 2 % 3 /UNITS 4 NONE	Select the UNITS LED that will be illuminated when the drive is running in speed control mode. For this parameter to be used, P178 must be set to a value other than 0. If P178 is set to 0, the HZ LED will be illuminated regardless of the value set in P177.	
			<p>NOTE: P177 is applicable to SMV 15HP (11kW) and greater models only.</p>		
P 178	Display Frequency Multiplier	0.00	0.00	650.00	<ul style="list-style-type: none"> Allows frequency display to be scaled P178 = 0.00: Scaling disabled P178 > 0.00: Display = Actual Frequency X P178
			<p>EXAMPLE If P178 = 29.17 and actual frequency = 60 Hz, then Drive displays 1750 (rpm)</p>		
P 179	Run Screen Display	0	0 {Parameter Number}	599	<ul style="list-style-type: none"> 0 = Normal Run Screen, this display depends on mode of operation. Refer to section 4.2. Other selections choose a diagnostic parameter to display (P501...P599).

(1) Any changes to this parameter will not take effect until the drive is stopped



Commissioning

Code		Possible Settings			IMPORTANT
No.	Name	Default	Selection		
P 181	Skip frequency 1	0.0	0.0 {Hz}	500	<ul style="list-style-type: none"> Drive will not run in the defined skip range; used to skip over frequencies that cause mechanical vibration P181 and P182 define the start of the skip ranges P184 > 0 defines the bandwidth of both ranges.
P 182	Skip frequency 2	0.0	0.0 {Hz}	500	
P 184	Skip frequency bandwidth	0.0	0.0 {Hz}	10.0	
			<p>NOTE Bandwidth (Hz) = f_s (Hz) + P184 (Hz) f_s = P181 or P182 EXAMPLE: P181 = 18 Hz and P184 = 4 Hz; skip range is from 18 to 22 Hz</p>		
P 194	Password	225	0000	9999	<ul style="list-style-type: none"> Must enter password to access parameters P194 = 0000: Disables password
P 197	Clear Fault History	0	0 No Action		
			1 Clear Fault History		
P 199	Program Selection		0 Operate from User settings		
			1 Operate from OEM settings	Refer to Notes 1, 2 and 3	
			2 Reset to OEM default settings	Refer to Note 1	
			3 Reset to 60 Hz default settings	<ul style="list-style-type: none"> Refer to Note 4 Parameters are reset to the defaults listed in this manual. For P199=4, the following exceptions apply: <ul style="list-style-type: none"> - P103, P152, P161, P167 = 50.0 Hz - P304 = 50 Hz; - P305 = 1450 RPM - P107 = 0 (480 V drives only) 	
			4 Reset to 50 Hz default settings		
			5 Translate	Refer to Note 5	
			<p>WARNING! Modification of P199 can affect drive functionality! STOP and EXTERNAL FAULT circuitry may be disabled! Check P100 and P121...P124</p>		
			<p>NOTE 1 If the EPM does not contain valid OEM settings, a flashing CF will be displayed when P199 is set to 1 or 2.</p>		
			<p>NOTE 2 When P199 is set to 1, the drive operates from the OEM settings stored in the EPM Module and no other parameters can be changed (CE will be displayed if attempted).</p>		
			<p>NOTE 3 Auto Calibration is not possible when operating from OEM Settings.</p>		
			<p>NOTE 4 Reset 60 and Reset 50 will set the Assertion Level (P120) to "2" (High). P120 may need to be reset for the digital input devices being used. An F_AL fault may occur if P120 and the Assertion switch are not set identically.</p>		
			<p>NOTE 5 If an EPM that contains data from a previous compatible software version is installed:</p> <ul style="list-style-type: none"> The drive will operate according to the previous data, but parameters cannot be changed (cE will be displayed if attempted) To update the EPM to the current software version, set P199 = 5. The parameters can now be changed but the EPM is incompatible with previous software revisions. 		



Commissioning

4.5.4 PID Parameters

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P200	PID Mode	0	0 Disabled 1 Normal-acting 2 Reverse-acting	<ul style="list-style-type: none"> Normal-acting: As feedback increases, motor speed decreases Reverse-acting: As feedback increases, motor speed increases PID mode is disabled in Vector Torque mode (P300 = 5)
<p>NOTE</p> <p>To activate PID mode, one of the TB-13 inputs (P121...P124) must be used to select the Auto Reference that matches the desired PID setpoint reference. If the selected PID setpoint reference uses the same analog signal as the PID feedback (P201), an F.L fault will occur.</p> <p>Example: The desired PID setpoint reference is the keypad (▲ and ▼). Set TB-13x = 6 (Auto Reference: Keypad):</p> <ul style="list-style-type: none"> TB-13x = closed: PID mode is active TB-13x = open: PID mode is disabled and the drive speed will be controlled by the reference selected in P101. 				
P201	PID Feedback Source	0	0 4-20 mA (TB-25) 1 0-10 VDC (TB-5)	Must be set to match the PID feedback signal
P202	PID Decimal Point	1	0 PID Display = XXXX 1 PID Display = XXX.X 2 PID Display = XX.XX 3 PID Display = X.XXX 4 PID Display = .XXXX	Applies to P204, P205, P214, P215, P231... P233, P242, P522, P523
P203	PID Units	0	0 % 1 /UNITS 2 AMPS 3 NONE	Select the UNITS LED that will be illuminated when the drive is running in PID control mode
<p>NOTE:</p> <p>P203 is applicable to SMV 15HP (11kW) and greater models only.</p>				
P204	Feedback at Minimum Signal	0.0	-99.9 3100.0	Set to match the range of the feedback signal being used
P205	Feedback at Maximum Signal	100.0	-99.9 3100.0	Example: Feedback signal is 0 - 300 PSI; P204 = 0.0, P205 = 300.0
P207	Proportional Gain	5.0	0.0 (%) 100.0	Used to tune the PID loop: <ul style="list-style-type: none"> Increase P207 until system becomes unstable, then decrease P207 by 10-15% Next, increase P208 until feedback matches setpoint If required, increase P209 to compensate for sudden changes in feedback
P208	Integral Gain	0.0	0.0 (s) 20.0	
P209	Derivative Gain	0.0	0.0 (s) 20.0	
<p>NOTE</p> <ul style="list-style-type: none"> Derivative Gain is very sensitive to noise on the feedback signal and must be used with care Derivative Gain is not normally required in pump and fan applications 				



Commissioning



Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P210	PID Setpoint Ramp	20.0	0.0 (s) 100.0	<ul style="list-style-type: none"> time of setpoint change from P204 to P205 or vice versa. Used to smooth the transition from one PID setpoint to another, such as when using the Preset PID Setpoints (P231...P233)
P214	Minimum Alarm	0.0	P204 P205	Use with P140, P142 = 18...23
P215	Maximum Alarm	0.0	P204 P205	
P231	Preset PID Setpoint #1	0.0	P204 P205	TB-13A activated; P121 = 3 and P200 = 1 or 2
P232	Preset PID Setpoint #2	0.0	P204 P205	TB-13B activated; P122 = 3 and P200 = 1 or 2
P233	Preset PID Setpoint #3	0.0	P204 P205	TB-13C activated; P123 = 3 and P200 = 1 or 2
P240	Sleep Threshold	0.0	0.0 (Hz) 500.0	<ul style="list-style-type: none"> If drive speed < P240 for longer than P241, output frequency = 0.0 Hz; drive display = 5LP P240 = 0.0: Sleep mode is disabled. P200 = 0...2: Drive will start again when speed command is above P240 P242 > 0.0: Drive will restart when the PID feedback differs from the setpoint by more than the value of P242 or when the PID loop requires a speed above P240.
P241	Sleep Delay	30.0	0.0 (s) 300.0	
P242	Sleep Bandwidth	0.0	0.0 B _{max}	
<p>Where: $B_{max} = I(P205 - P204)$</p>				



Commissioning

4.5.5 Vector Parameters

Code		Possible Settings		IMPORTANT	
No.	Name	Default	Selection		
P300 ⁽¹⁾	Drive Mode	0	0 Constant V/Hz	Constant torque V/Hz control for general applications	
			1 Variable V/Hz	Variable torque V/Hz control for centrifugal pump and fan applications	
			2 Enhanced Constant V/Hz	For single or multiple motor applications that require better performance than settings 0 or 1, but cannot use Vector mode, due to: <ul style="list-style-type: none"> • Missing required motor data • Vector mode causing unstable motor operation 	
			3 Enhanced Variable V/Hz		
			4 Vector Speed	For single-motor applications requiring higher starting torque and speed regulation	
			5 Vector Torque	For single-motor applications requiring torque control independent of speed	
NOTE To configure the drive for either Vector mode or Enhanced V/Hz mode: <ul style="list-style-type: none"> • P300 = 4, 5: <ul style="list-style-type: none"> - Set P302...P306 according to motor nameplate - Set P399 = 1 - Make sure motor is cold (20° - 25° C) and apply a Start command - Display will indicate <i>CAL</i> for about 40 seconds - Once the calibration is complete, the display will indicate <i>StoP</i>; apply another Start command to actually start the motor - If an attempt is made to start the drive in Vector or Enhanced V/Hz mode before performing the Motor Calibration, the drive will display <i>F_n l d</i> and will not operate • P300 = 2, 3: Same as above but only need to set P302...P304 					
P302 ⁽¹⁾	Motor Rated Voltage	0	{V}	600	<ul style="list-style-type: none"> • Default setting = drive rating • Set to motor nameplate data
P303 ⁽¹⁾	Motor Rated Current	0.0	{A}	500.0	
P304 ⁽¹⁾	Motor Rated Frequency	60	{Hz}	1000	Set to motor nameplate data
P305 ⁽¹⁾	Motor Rated Speed	1750	{RPM}	65000	
P306 ⁽¹⁾	Motor Cosine Phi	0.80	0.40	0.99	
NOTE If motor cosine phi is not known, use one of the following formulas: $\cos \phi = \text{motor Watts} / (\text{motor efficiency} \times P302 \times P303 \times 1.732)$ $\cos \phi = \cos [\sin^{-1} (\text{magnetizing current} / \text{motor current})]$					
P310 ⁽¹⁾	Motor Stator Resistance	0.00	{Ω}	64.00	<ul style="list-style-type: none"> • Will be automatically programmed by P399 • Changing these settings can adversely affect performance. Contact factory technical support prior to changing
P311 ⁽¹⁾	Motor Stator Inductance	0.0	{mH}	2000	
P330	Torque Limit	100	{%}	400	When P300 = 5, sets the maximum output torque.

(1) Any changes to this parameter will not take effect until the drive is stopped



Commissioning

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P331	Preset Torque Setpoint #1	100	0 (%) 400	TB-13A activated; P121 = 3 and P300 = 5
P332	Preset Torque Setpoint #2	100	0 (%) 400	TB-13B activated; P122 = 3 and P300 = 5
P333	Preset Torque Setpoint #3	100	0 (%) 400	TB-13C activated; P123 = 3 and P300 = 5
P340 ⁽¹⁾	Current Loop P Gain	0.25	0.00 16.0	Changing these settings can adversely affect performance. Contact factory technical support prior to changing.
P341 ⁽¹⁾	Current Loop I Gain	65	12 (ms) 9990	
P342 ⁽¹⁾	Speed Loop Adjust	0.0	0.0 (%) 20.0	
P399	Motor Auto-calibration	0	0 Calibration Not Done	<ul style="list-style-type: none"> • If P300 = 2...5, motor calibration must be performed, but motor data must be programmed first • An alternating <i>CAL</i> / <i>Err</i> will occur if: <ul style="list-style-type: none"> - motor calibration is attempted with P300 = 0 or 1 - motor calibration is attempted before programming motor data
			1 Calibration Enabled	
			2 Calibration Complete	
NOTE: To run the Auto Calibration: <ul style="list-style-type: none"> - Set P302...P306 according to motor nameplate - Set P399 = 1 - Make sure motor is cold (20° - 25° C) - Apply a Start command - Display will indicate <i>CAL</i> for about 40 seconds - Once the calibration is complete, the display will indicate <i>StoP</i>; apply another Start command to actually start the motor - Parameter P399 will now be set to 2. 				

(1) Any changes to this parameter will not take effect until the drive is stopped.

4.5.6 Network Parameters

Code		Possible Settings		IMPORTANT
No.	Name	Default	Selection	
P400	Network Protocol		0 Not Active	This parameter setting is based upon the network or I/O module that is installed.
			1 Remote Keypad	
			2 Modbus RTU	
			3 CANopen	
			4 DeviceNet	
			5 Ethernet	
			6 Profibus	
			7 Lecom-B	
8 I/O Module				
P401 ... P499	Module Specific Parameters			Refer to the Communications Reference Guide specific to the network or I/O module installed.



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4.5.7 Diagnostic Parameters

Code No.	Name	Display Range (READ ONLY)		IMPORTANT
P500	Fault History			<ul style="list-style-type: none"> Displays the last 8 faults Format: n.xxx where: n = 1..8; 1 is the newest fault xxx = fault message (without the F.) Refer to section 5.3
P501	Software Version			Format: x.yz
P502	Drive ID			A flashing display indicates that the Drive ID stored in the EPM does not match the drive model it is plugged into.
P503	Internal Code			Alternating Display: xxx-; -yy
P505	DC Bus Voltage	0	{VDC} 1500	
P506	Motor Voltage	0	{VAC} 1000	
P507	Load	0	{%} 255	Motor load as % of drive's output current rating. Refer to section 2.3.
P508	Motor Current	0.0	{A} 1000	Actual motor current
P509	Torque	0	{%} 500	Torque as % of motor rated torque (vector mode only)
PS10	kW	0.00	{kW} 650.0	
PS11	kWh	0.0	{kWh} 9999999	Alternating display: xxx-; yyyy when value exceeds 9999
PS12	Heatsink Temp	0	{°C} 150	Heatsink temperature
PS20	0-10 VDC Input	0.0	{VDC} 10.0	Actual value of signal at TB-5
PS21	4-20 mA Input	0.0	{mA} 20.0	Actual value of signal at TB-5
PS22	TB-5 Feedback	P204	P205	TB-5 signal value scaled to PID feedback units
PS23	TB-25 Feedback	P204	P205	TB-25 signal value scaled to PID feedback units
PS25	Analog Output	0	{VDC} 10.0	Refer to P150...P155
PS27	Actual Output Frequency	0	{Hz} 500.0	
PS28	Network Speed Command	0	{Hz} 500.0	Command speed if (Auto: Network) is selected as the speed source
PS30	Terminal and Protection Status			Indicates terminal status using segments of the LED display. (Refer to section 4.5.7.1)
PS31	Keypad Status			Indicates keypad button status using segments of the LED display. (Refer to section 4.5.7.2)
PS40	Total Run Time	0	{h} 9999999	Alternating display: xxx-; yyyy when value exceeds 9999
PS41	Total Power On Time	0	{h} 9999999	

Commissioning

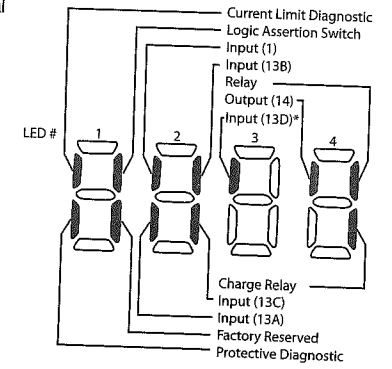


4.5.7.1 Terminal & Protection Status Display

Parameter P530 allows monitoring of the control terminal points and common drive conditions:

An illuminated LED segment indicates:

- the protective circuit is active (LED 1)
- the Logic Assertion Switch is set to High (+)
- input terminal is asserted (LED 2)
- output terminal is energized (LED 4)
- the Charge Relay is not a terminal, this segment will be illuminated when the Charge Relay is energized (LED 4).



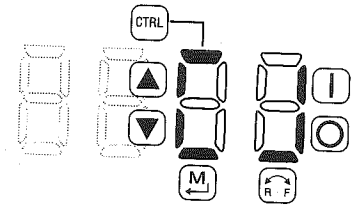
* Input 13D available on 15-30HP (11-22kW) models only

4.5.7.2 Keypad Status Display

Parameter P531 allows monitoring of the keypad pushbuttons:

An illuminated LED segment indicates when the button is depressed.

LED 1 and LED 2 are used to indicate pushbutton presses on a remote keypad that is attached to the drive. LED 3 and LED 4 indicate button presses on the local drive keypad.



4.5.8 Onboard Communications Parameters 15-30HP (11-22kW)

The P6xx Onboard Communication parameters are applicable to the 15HP (11kW) and greater models only.

Code No.	Name	Possible Settings	IMPORTANT
P600	Network Enable	0 Disabled	This parameter enables the onboard network communications.
		1 Remote Keypad	
P610	Network Address	2 Modbus	NOTE: Onboard Communications will be disabled if: - P600 = 0, or - P600 = 1 and P400 = 1, or - P600 = 2 and P400 = 2, 3, 4, 5, 6 or 7 - P600 = 7 and P400 = 2, 3, 4, 5, 6 or 7 If the onboard communications are disabled, the user will not have access to any of the other P6xx parameters.
		7 Lecom	
P610	Network Address	1 1 - 247	Modbus
		1 1 - 99	Lecom



Troubleshooting and Diagnostics

Status / Warning	Cause	Remedy
SLP	Sleep Mode is active	Refer to P240...P242
SP	Start Pending	The drive has tripped into a fault and will automatically restart (P110 = 3...6) To disable Auto-Restart, set P110 = 0...2
SPd	PID Mode disabled.	Drive has been taken out of PID Mode. Refer to P200.
StoP	Output frequency = 0 Hz (outputs U, V, W inhibited)	Stop has been commanded from the keypad, terminal strip, or network Apply Start command (Start Control source depends on P100)

5.2 Drive Configuration Messages

When the Mode button is pressed and held, the drive's display will provide a 4-digit code that indicates how the drive is configured. If the drive is in a Stop state when this is done, the display will also indicate which control source commanded the drive to Stop (the two displays will alternate every second).

Configuration Display			
Format = x.y.zz	x = Control Source: L = Local Keypad t = Terminal Strip r = Remote Keypad n = Network	y = Mode: S = Speed mode P = PID mode t = Vector Torque mode	zz = Reference: CP = Keypad ▲ ▼ EU = 0-10 VDC (TB-5) E I = 4-20 mA (TB-25) JG = Jog nE = Network OP = MOP P L...P7 = Preset 1...7
Example:			
<ul style="list-style-type: none"> L_S_CP = Local Keypad Start control, Speed mode, Keypad speed reference t_P_EU = Terminal Strip Start control, PID mode, 0-10 VDC setpoint reference n_t_P2 = Network Start control, Vector Torque mode, Preset Torque #2 reference 			
Stop Source Display			
Format = x_5tP	L_5tP = Stop command came from Local Keypad t_5tP = Stop command came from Terminal Strip r_5tP = Stop command came from Remote Keypad n_5tP = Stop command came from Network		

Troubleshooting and Diagnostics



5.3 Fault Messages

The messages below show how they will appear on the display when the drive trips. When looking at the Fault History (P500), the F_ will not appear in the fault message.

Fault	Cause	Remedy ⁽¹⁾	
F_AF	High Temperature fault	Drive is too hot inside <ul style="list-style-type: none"> Reduce drive load Improve cooling 	
F_AL	Assertion Level fault	<ul style="list-style-type: none"> Assertion Level switch is changed during operation P120 is changed during operation P100 or P121...P124 are set to a value other than 0 and P120 does not match the Assertion Level Switch. <ul style="list-style-type: none"> Make sure the Assertion Level switch and P120 are both set for the type of input devices being used, prior to setting P100 or P121...P124. Refer to 3.2.3 and P120. 	
F_bF	Personality fault	Drive Hardware <ul style="list-style-type: none"> Cycle Power 	
F_CF	Control fault	An EPM has been installed that is either blank or corrupted <ul style="list-style-type: none"> Power down and install EPM with valid data 	
F_cF	Incompatible EPM fault	An EPM has been installed that contains data from an incompatible parameter version <ul style="list-style-type: none"> Reset the drive back to defaults (P199 = 3, 4) and then re-program If problem persists, contact factory technical support 	
F_dbF	Dynamic Braking fault	Dynamic braking resistors are overheating <ul style="list-style-type: none"> Increase active decel time (P105, P126, P127). Check mains voltage and P107 	
F_EF	External fault	<ul style="list-style-type: none"> P121...P124 = 21 and that digital input has been opened. P121...P124 = 22 and that digital input has been closed. <ul style="list-style-type: none"> Correct the external fault condition Make sure digital input is set properly for NC or NO circuit 	
F_F I	EPM fault	EPM missing or defective <ul style="list-style-type: none"> Power down and replace EPM 	
F_F2 ... F_F I2	Internal faults	Contact factory technical support	
F_Fnr	Control Configuration Fault	The drive is setup for REMOTE KEYPAD control (P100=2 or 5) but is not setup to communicate with a remote keypad The drive is setup for NETWORK ONLY control (P100=3) but is not setup for network communications	Set P400 = 1, or P600 = 1 Set P400 or P600 to a valid network communications protocol selection
F_FoL	Loss of 4-20 mA signal fault	4-20 mA signal (at TB-25) is below 2 mA (P163 = 1)	Check signal/signal wire
F_GF	OEM Defaults data fault	Drive is powered up with P199 = 1 and OEM settings in the EPM are not valid.	Install an EPM containing valid OEM Defaults data or change P199 to 0.
F_HF	High DC Bus Voltage fault	Mains voltage is too high Decel time is too short, or too much regen from motor	Check mains voltage and P107 Increase active decel time (P105, P126, P127) or install Dynamic Braking option

(1) The drive can only be restarted if the error message has been reset.



Troubleshooting and Diagnostics

Fault	Cause	Remedy ⁽¹⁾
F_IL Digital Input Configuration fault (P121... P124)	More than one digital input set for the same function	Each setting can only be used once (except settings 0 and 3)
	Only one digital input configured for MOP function (Up, Down)	One input must be set to MOP Up, another must be set to MOP Down
	PID mode is entered with setpoint reference and feedback source set to the same analog signal	Change PID setpoint reference (P121... P124) or feedback source (P201).
	One of the digital inputs (P121...P124) is set to 10 and another is set to 11...14.	Reconfigure digital inputs
	One of the digital inputs (P121...P124) is set to 11 or 12 and another is set to 13 or 14.	
	PID enabled in Vector Torque mode (P200 = 1 or 2 and P300 = 5)	PID cannot be used in Vector Torque mode
F_UF	Remote keypad fault	Remote keypad disconnected Check remote keypad connections
F_LF	Low DC Bus Voltage fault	Mains voltage too low Check mains voltage
F_nId	No Motor ID fault	An attempt was made to start the drive in Vector or Enhanced V/Hz mode prior to performing the Motor Auto-calibration See P300...P399 for Drive Mode setup and calibration.
F_nIF	Module communication fault	Communication failure between drive and Network Module. Check module connections
F_nFI ... F_nF9	Network Faults	Refer to the module documentation, for Causes and Remedies.
F_DF	Output fault: Transistor fault	Output short circuit Check motor/motor cable
		Acceleration time too short Increase P104, P125
		Severe motor overload, due to: • Mechanical problem • Drive/motor too small for application • Check machine / system • Verify drive/motor are proper size for application
		Boost values too high Decrease P168, P169
		Excessive capacitive charging current of the motor cable • Use shorter motor cables with lower charging current • Use low capacitance motor cables • Install reactor between motor and drive.
	Failed output transistor Contact factory technical support	
F_DF1	Output fault: Ground fault	Grounded motor phase Check motor and motor cable
		Excessive capacitive charging current of the motor cable Use shorter motor cables with lower charging current
F_PF	Motor Overload fault	Excessive motor load for too long • Verify proper setting of P108 • Verify drive and motor are proper size for application
F_rF	Flying Restart fault	Controller was unable to synchronize with the motor during restart attempt; (P110 = 5 or 6) Check motor / load

(1) The drive can only be restarted if the error message has been reset.



Troubleshooting and Diagnostics

Fault	Cause	Remedy ⁽¹⁾
F_SF	Single-Phase fault	A mains phase has been lost Check mains voltage
F_UF	Start fault	Start command was present when power was applied (P110 = 0 or 2). • Must wait at least 2 seconds after power-up to apply Start command • Consider alternate starting method (refer to P110).

(1) The drive can only be restarted if the error message has been reset.



Appendix A

A.1 Permissible Cable Lengths

The table herein lists the permissible cable lengths for use with an SMV inverter with an internal EMC filter.

**NOTE**

This table is intended as a reference guideline only; application results may vary. The values in this table are based on testing with commonly available low-capacitance shielded cable and commonly available AC induction motors. Testing is conducted at worst case speeds and loads.

Maximum Permissible Cable Lengths (Meters) for SMV Model with Internal EMC Filters										
Mains	Model	4 kHz Carrier (P166 = 0)		6 kHz Carrier (P166 = 1)		8 kHz Carrier (P166 = 2)		10 kHz Carrier (P166 = 3)		
		Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	
240 V, 1-phase (2/PE)	ESV251 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
	ESV371 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
	ESV751 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
	ESV112 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
	ESV152 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
	ESV222 $\phi\phi$ 2SF ϕ	38	12	35	10	33	5	30	N/A	
400/480 V, 3-phase (3/PE)	ESV371 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV751 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV112 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV152 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV222 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV302 $\phi\phi$ 4TF ϕ	30	4	25	2	20	N/A	10	N/A	
	ESV402 $\phi\phi$ 4TF ϕ	54	5	48	3	42	2	N/A	N/A	
	ESV552 $\phi\phi$ 4TF ϕ	54	5	48	3	42	2	N/A	N/A	
	ESV752 $\phi\phi$ 4TF ϕ	54	5	48	3	42	2	N/A	N/A	

NOTE: The " $\phi\phi$ " and " ϕ " symbols are place holders in the Model part number that contain different information depending on the specific configuration of the model. Refer to the SMV Type Number Designation table in section 2.2 for more information.

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S V 0 1 H

#1 CHAIN BREAKER TIP

Made of tool steel -

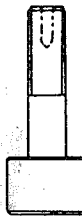
1 - replacement tip for 25 - 60 Chain Tool



TIP- Knurled part should not go into hole.

ADHESIVE - Drop slug into hole and heat.

Be sure to check depth of hole before inserting tip.
Heat end of screw (approx. 200°).
Keep tip pressed in until adhesive hardens.



Can be heated with a candle or common kit

Remove damaged tip with tip and screw (approx. 30 removed by striking screw while hot, hold tip end do

Do Not Heat Too Hot B

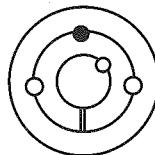
REPLA
TIPS -- SC

*Info. on chain drive
(higher speed range)
installed 5/17/19*

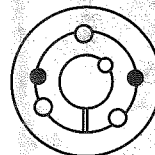
Martin BUSHING

INSTALLATION & REMOVAL INSTRUCTIONS

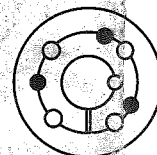
IMPORTANT NOTE: Please follow the instructions on this sheet in order for the *Martin* bushing to perform satisfactorily.



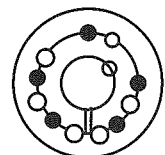
1008 to 3030



3535 to 6050



7060 to 1085



102100

INSTALLATION

1. Clean all oil, dirt, and paint from shaft, bushing bore, outside of bushing and component (sprocket, sheave...etc.) bore.
2. Insert bushing into component. Match the hole pattern, not the threaded holes (each hole will be threaded on one side only.)
3. Oil set or cap screws and thread into those half threaded holes indicated by ○ on above diagram. Mount assembly on shaft.
4. Alternately torque set or cap screws* to recommended torque setting in chart below.
5. On 3535 and larger bushings use a block, sleeve or drift and hammer large end of bushing (do not hammer bushing directly).
6. Repeat steps 4 and 5 until torque wrench reading, after hammering, is the same as before hammering.
7. Fill all unoccupied holes with grease.

REMOVAL

1. Remove all set or cap screws.
2. Insert set or cap screws in holes indicated by ● on drawing. Loosen bushing by alternately tightening set or cap screws.
3. To reinstall, complete all seven (7) installation instructions.

RECOMMENDED TORQUE TABLE

Bushing No.	Set or Cap Screw	Wrench Torque in. / lbs.
1008, 1108	1/4 - 20 Socket Set Screw	55
1210, 1215, 1310	3/8 - 16 Socket Set Screw	175
1610, 1615	3/8 - 16 Socket Set Screw	175
2012	7/16 - 14 Socket Set Screw	280
2517, 2525	1/2 - 13 Socket Set Screw	430
3020, 3030	5/8 - 11 Socket Set Screw	800
3535	1/2 - 13 Socket Head Cap Screw	1,000
4040	5/8 - 11 Socket Head Cap Screw	1,700
4545	3/4 - 10 Socket Head Cap Screw	2,450
5050	7/8 - 9 Socket Head Cap Screw	3,100
6050, 7060, 8065	1-1/4 - 7 Socket Head Cap Screw	7,820
10085, 120100	1 - 1/2 - 6 Socket Head Cap Screw	13,700

* If two bushings are used on same component and shaft, fully tighten one bushing before working on the other.

CAUTION

WARNING: USE OF ANTI-SEIZE LUBRICANT ON TAPERED CONE SURFACES OR ON BOLT THREADS WHEN MOUNTING MAY RESULT IN DAMAGE TO SHEAVES AND SPROCKETS. THIS VOIDS ALL MANUFACTURER'S WARRANTIES.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed: Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions given above must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. All rotating power transmission products when used in a drive are potentially dangerous and must be guarded by the user as required by applicable laws, regulations, standards, and good safety practice. (Refer to ANSI Standard B15.1.)

Maxwell Chain Sprockets (18, 21)

CH 15

WAGNER MODEL R2R-1

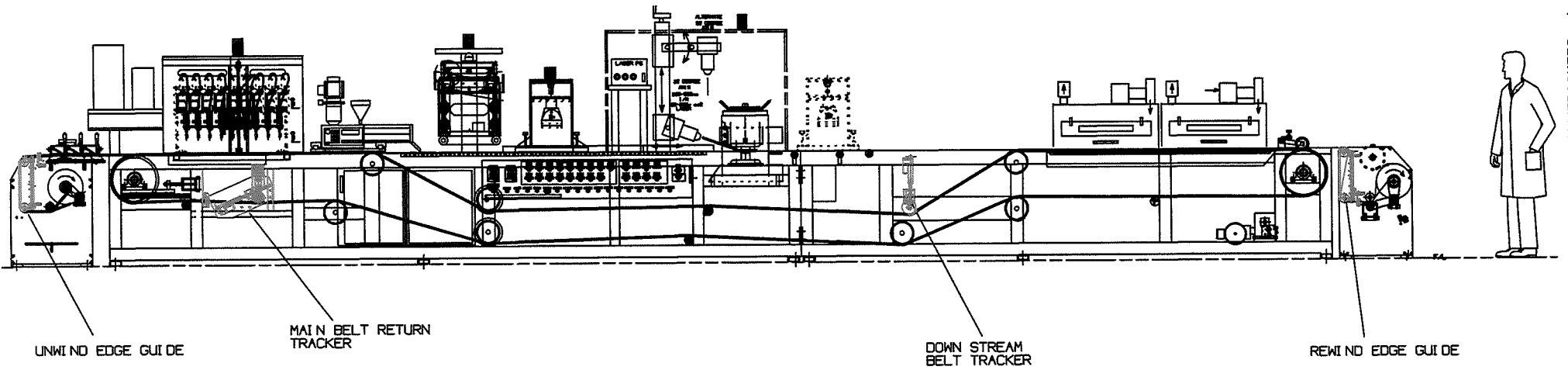
S/N H3859

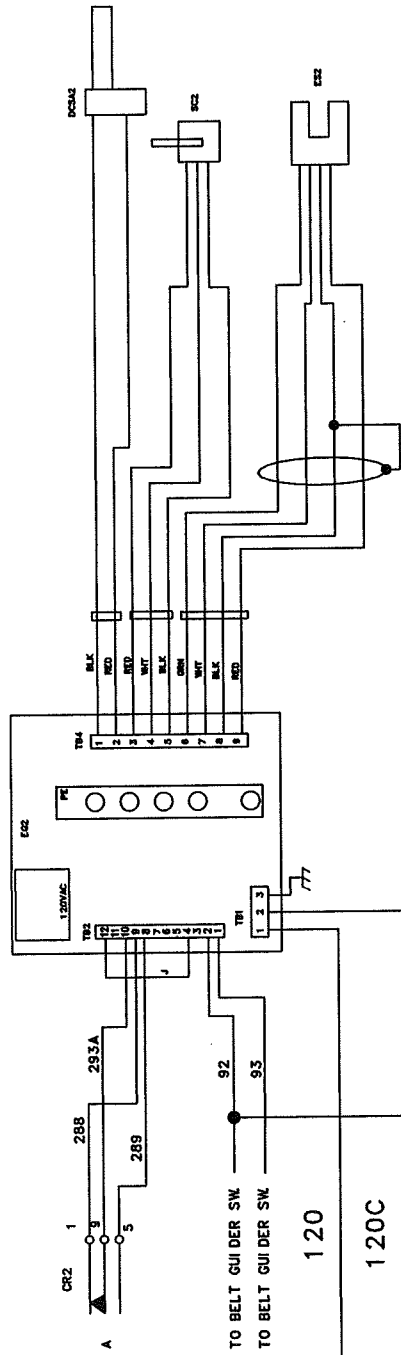
BELT TRACKERS

SEC 15

THE R2R-1 MACHINE IS EXCEPTIONAL IN THAT THE STAINLESS STEEL BELT IS NOT A STRAIGHT THRU PATH. BECAUSE OF THE NEED TO KEEP THE BELT AWAY FROM EXCESSIVE HEAT SOURCES THAT WOULD CAUSE THE BELT TO WARP OR "CANOE" (DISH), WAGNER INDUSTRIES DESIGNED A UNIQUE PATH THAT STEERS THE STAINLESS CARRIER BELT UNDER THE HEAT GENERATING SECTIONS AND TURNS THE BELT BACK UP TO THE NORMAL SUBSTRATE PASS LINE. A TOTAL OF 10 TURNS OR CHANGES IN BELT DIRECTION WERE REQUIRED. MORE THAN ANY OTHER STEEL BELT APPLICATION KNOWN UNTIL THEN. IN SO DOING, THE BELT HAS A TENDENCY TO WALK OR "CAMBER" TO ONE SIDE OF THE MACHINE OR THE OTHER. TO CORRECT THIS TENDENCY, WAGNER INDUSTRIES DESIGNED AND INSTALLED 2 SEPARATE "TRACKER GUIDES" THAT USE AN OPTICAL BELT EDGE SENSOR AND THE PROPORTIONAL EDGE GUIDE AMPLIFIER BUILT BY WAGNER. THE OUTPUT SIGNAL OF THE AMPLIFIER CONTROLS A DC SERVO BALLSCREW ACTUATOR THAT CAUSES A ROLLER TO "TIP" UPWARD OR TILT DOWNWARD AT A PRECISE ANGLE THAT CAUSES THE BELT TO MOVE TOWARD THE LOOSER SIDE. ONE OF THESE TRACKERS WAS PLACED DOWNSTREAM FROM THE MAGNET, JUST BEFORE THE OVENS. THE MAIN TRACKER IS LOCATED UNDER THE E-SPIN CABINET. BOTH TRACKERS HAVE THE ASSOCIATED AMPLIFIERS MOUNTED AT THE REAR FRAME OF THE MACHINE. AS A PRECAUTION, EACH HAS A SET OF "FEELER" PROBES THAT SENSE THE BELT IF IT WERE TO MOVE TO A DISTANCE OF + OR - 1" FROM THE NORMAL GUIDED PATH. THE TRACKERS TYPICALLY HOLD PLUS OR MINUS 1MM ACCURACY. SINCE THE BELT COST IS MANY THOUSANDS OF DOLLARS, IT WAS PRUDENT TO ADD THIS FEATURE. THE AMPLIFIER ELECTRONICS IS ON A SINGLE PLUG-IN CARD WITHIN THE EDGE GUIDE ENCLOSURES AT EACH LOCATION. THIS CARD IS IDENTICAL TO BOTH THE UNWIND AS WELL AS THE REWIND EDGE GUIDE SYSTEMS AND IS INTERCHANGEABLE.

R2R-1 MACHINE
BELT TRACKER AND EDGE GUIDE LOCATIONS





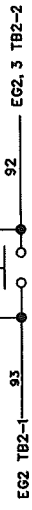
BELT GUIDER

BELT GUIDER
CTR. OFF AUTO

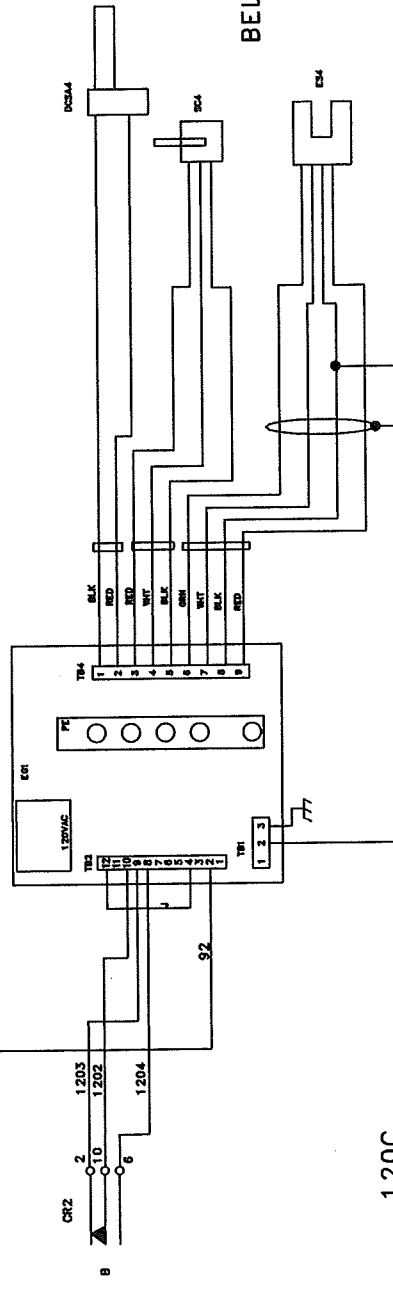
CR2
OMRON MY4



TO LINE START
P.B.



BELT OVEN GUIDER



120C

WAGNER INDUSTRIES, INC.
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WEBSITE: www.wagner-industries.com

**INSTALLATION AND OPERATING INSTRUCTIONS FOR WAGNER
INDUSTRIES PHOTOELECTRIC EDGE GUIDE CONTROLS.**

MODEL #:

SERIAL #:

CUSTOMER:

SHIP DATE:

GENERAL INSTRUCTIONS

READ ALL INSTRUCTIONS FIRST BEFORE DOING ACTUAL INSTALLATION.

Install edge sensor, line sensor, servo actuator and servo centering unit (if ordered with this option), as per wiring diagram.

To change from a PHOTO ELECTRIC to ULTRASONIC system or vice versa, simply remove (disconnect) the original PLUG-IN CARD and SENSOR. Install new PLUG-IN CARD and SENSOR. If using line guide, plug in amplifier card and connect line sensor to TB4.

Follow SET UP procedure for the type of system now installed.

MAIN CONTROLS AND INDICATORS

- A.) Auto/off/manual switch – selects mode of operation.
- B.) Left/right switch – in manual moves guider frame in direction indicated.
- C.) Servo center/run switch – selects servo center function in the AUTO mode. (If ordered with this option).
- D.) Power Lite – shows AC is present, will NOT come on if AC fuse is blown.
- E.) Direction LED's – show direction of guider frame movement.

CONTROLS AND SWITCHES – PHOTO ELECTRIC SENSOR AND PLUG-IN CARD

1.) CLEAR/OPAQUE switch

This switch is set for the proper web opacity, it selects the CLEAR or OPAQUE GAIN controls.

2.) CLEAR GAIN control

This 10 turn control is used to set the proper operating point for a (semi) transparent web, when the CLEAR/OPAQUE switch is set to the opaque position.

3.) OPAQUE GAIN control

This control is used to set the proper operating point for an opaque web, when the CLEAR/OPAQUE switch is set to the opaque position.

4.) GAIN SET LED indicator

This LED is primarily used during set up, to tell the operator that the proper operating point has been set.

5.) CORRECTION or RATE control

This control adjusts the speed of the servo actuator. Maximum speed is when this control is fully clockwise.

6.) DAMPING control

This control is used to prevent overshoot or “hunting”. Maximum damping occurs when this control is set fully clockwise.

SET UP INSTRUCTIONS – PHOTO ELECTRIC SYSTEM

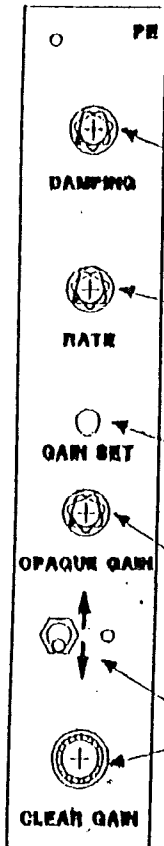
- 1.) Initial settings of controls (plug-in card).
 - A.) CLEAR GAIN fully CCW.
 - B.) OPAQUE GAIN fully CCW.
 - C.) DAMPING fully CCW.
 - D.) RATE fully CW.
- 2.) Initial setting of Main controls.
 - A.) AUTO/MANUAL switch to AUTO.
 - B.) SERVO CENTER/RUN switch (optional item) to RUN.
- 3.) Set CLEAR/OPAQUE switch for proper material.
- 4.) Turn power ON.
- 5.) WITHOUT any web in the edge sensor, slowly rotate the selected GAIN control clockwise until the GAIN SET LED is JUST FULLY ILLUMINATED. This is the proper operating point. DO NOT advance this control further, as improper operation can result.
- 6.) Check for correct direction of the actuator. (While blocking the sensor, the guider frame should move away from the sensor). If the action of the actuator is incorrect, reverse the two wires at TB-4 terminals 1 and 2.
- 7.) With a web in the sensor, run the machine. Adjust CORRECTION or RATE control and DAMPING control as needed.
- 8.) Check for correct action of the servo center unit. If the action is incorrect then reverse red and black wires at TB-4 terminals 3 and 5.

OPERATOR PANEL

INSIDE ENCLOSURE-

PHOTOELECTRIC SENSING VERSION ONLY

DESCRIPTION



VIEW OF OPERATOR PANEL LOCATED INSIDE ELECTRICAL ENCLOSURE.

DAMPING CONTROL SETS STABLE OPERATION OF GUIDER FRAME.

RATE SETS CORRECTION SPEED OF GUIDER FRAME.

GAIN SET IS USED TO INDICATE PROPER SETTING OF GAIN CONTROLS. ROTATE GAIN POT UNTIL THIS INDICATOR JUST COMES ON.

OPAQUE & CLEAR GAIN POTS ARE USED TO SET PROPER OPERATING POINTS AND IS SET BY USING GAIN SET INDICATOR.

CLEAR/OPAQUE GAIN SELECT SWITCH SETS WEB TYPE BEING GUIDED.

TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
	No.	DATE	BY
DECIMAL +/-	1		
	2		
	3		
FRACTIONAL +/-	4		
	5		
	6		
ANGULAR +/-	7		
	8		



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Stanhope, NJ 07874

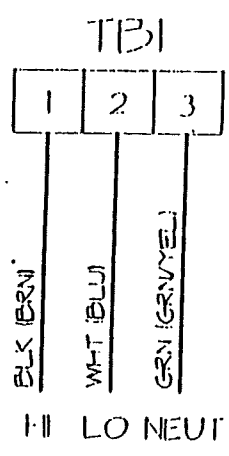
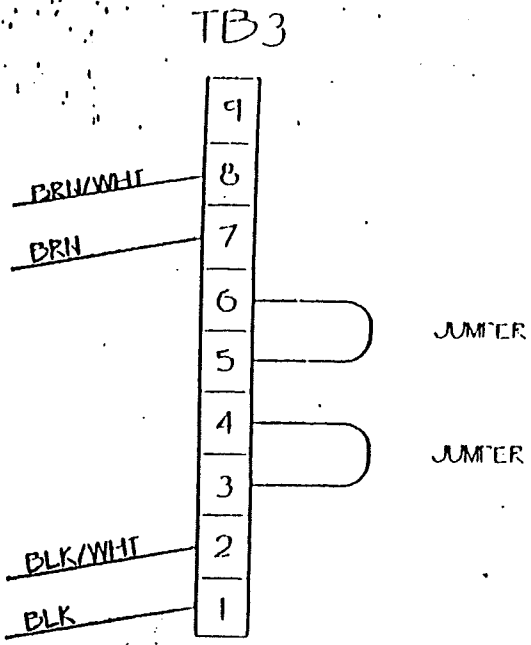
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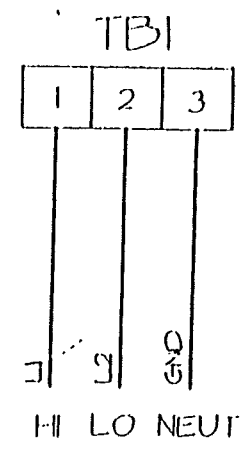
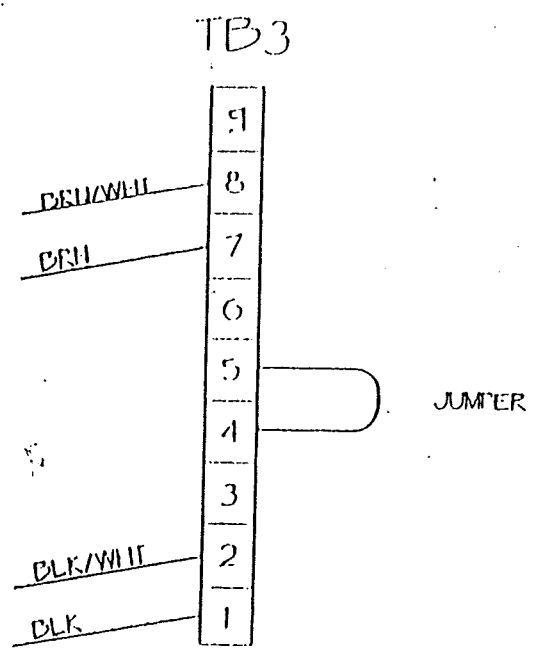
OPERATORS PANEL

EDGE GUIDE CONTROL ENCLOSURE- P/E & U/S

SCALE: NA	DRAWN BY WSW	ENGINEERING DRAWING No.
DATE: 7-3-90	CHK'D RPG	EGPANLI



120V 50-60HZ
SINGLE PHASE CONNECTION



240V 50-60HZ
SINGLE PHASE CONNECTION

TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
	No.	DATE	BY
DECIMAL ±/-	1		
	2		
	3		
FRACTIONAL ±/-	4		
	5		
	6		
ANGULAR ±/-	7		
	8		



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POWER CONNECTIONS
FOR EDGE GUIDE

SCALE: NTS	DRAWN BY RPG	ENGINEERING DRAWING No. TBI
DATE: 2/7/92	CHK'D	

