

Bulletin 4805

MAGNIFIER^{AC}

AC Sourced Lifting Magnet Control

Catalog

18



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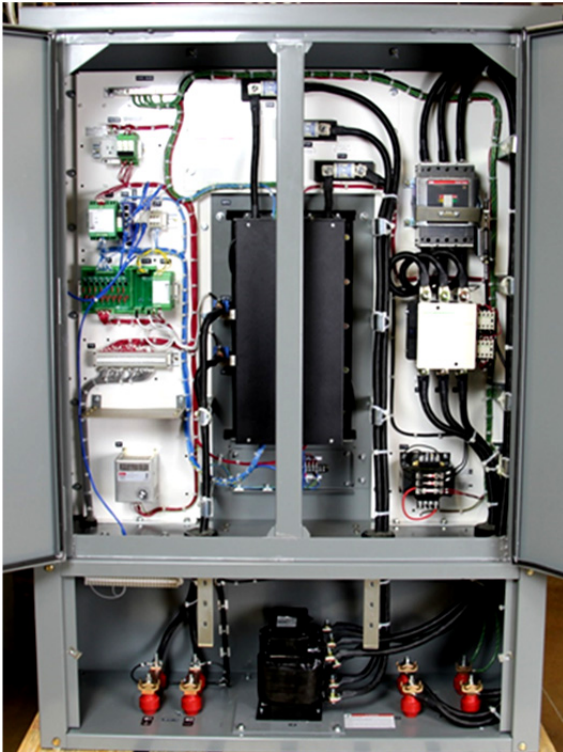
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Industrial Controls Division

GENERAL INFORMATION

The patented Bulletin 4805 **MAGNIFIERAG**, Type R, high performance lifting magnet controller is used for DC magnets with cold current rated 15 to 300 Amperes, located on any AC supplied crane system. Typical applications include cranes with DC magnets handling scrap, slabs or coils. Controllers are rated to 50°C ambient (enclosed) and are suitable for full or partial voltage magnets. For AC sourced cranes, the **MAGNIFIERAG** alone replaces a transformer, rectifier, and a DC magnet controller. For DC supplied cranes, reference Euclid™ Bulletins 4291 / 4292 / 4295 / 4296, Cableform DDC, or EC&M Bulletin 6815 DC sourced Magnet Controllers.



Bulletin 4805 Type 4R300

- Patented AC to DC solid-state magnet controller.
- Eliminates AC to DC rectifier for reduced crane maintenance, weight and energy loss.
- The **MAGNIFIERAG** may use existing LIFT/DROP master switch or appropriate pushbutton controls.
- Voltage boost is standard, for fast magnet charge and discharge.
- Adjustable overvoltage to 550VDC for magnified lifts, without a special AC to DC rectifier or magnet.
- Voltage and current control modes for optimum magnet operations
- Voltage cutback is standard for scrap applications to allow cool magnet operation.
- Self-protection of control against power loss, cut cables, grounded magnets, and magnet short circuits.
- Three tier magnet over-temperature monitor, for alarm or for operations cutback.
- Diagnostics, with full text fault descriptions, time and date stamped
- Standard AC input voltages are 380VAC or 480VAC, 3Ø, 50/60HZ.
- Reduced contactor tip maintenance.
- Separate compartment for all external connections.

MAGNIFIERAG™ SELECTION TABLE

Bulletin 4805 Type [∇]	Magnet Cold Current Range 50°C, altitude below 1000m (3300ft) [♦]	AC Input Voltage*	Enclosure
4R300	15 - 300A	460VAC, 3Ø	NEMA12
3R300	15 - 300A	380VAC, 3Ø	

[∇] Select the controller to match or exceed the magnet nameplate cold current rating; or to match or exceed the total of all magnet rated cold currents operated in parallel (see **CONTROLLER MODIFICATIONS**, Form **W1**).

[♦] For altitudes above 1000m (3300ft) see **RATINGS and FEATURES**, below. For controllers rated for higher and lower magnet current, consult factory.

* For alternate system voltages, see Form V99 below, and consult factory

CONTROLLER MODIFICATIONS

Form	Description	Function
P	Partial Voltage Magnet	Pre-programmed for use with partial voltage magnet. Size controller based on the continuous current rating information. Advise intermittent voltage & continuous holding voltage rating
W1	Multiple magnets wired in parallel	Changes the wiring diagram for connection to paralleled magnets. Equally rated magnets recommended.
V99*	Special Power Supply Voltage Rating	Supplies a separately mounted power transformer for input line voltage other than 460 or 380, advise supply voltage



Standard Bulletin 4805 **MAGNIFIER^{AG}** Controller contains:

- 1 – AC Molded Case Disconnect Switch (MCS)
- 1 – AC Main Contactor (M)
- 1 – Line Reactor (LR) for power conditioning of recovered magnet energy
- 3 – AC Power Fuses (FU11, FU12, FU13)
- 1 – Programmable AC to DC Magnet Power Source (MPS)
- 1 – Control Circuit Transformer, fused (CTR)
- 4 – Relays: ALARM (A), TRIP (T), CR1, CR2
- 1 – Fan Power Supply (FPS), and (2) external Fans
- 1 – Unmanaged Ethernet Switch (UMES)
- 1 – Internal Ethernet port RJ45, for external permanent HMI connection (1PoE)
- 1 – Flange mounted Ethernet port, RJ45, for external portable HMI connection (2PoE)
- 1 – Cabinet Space Heater (SH)

Standard programmed features available when activated:

- Storage for four sets of magnet cold current and operating parameters, selection via customer supplied selector switch
- Magnet temperature detection and alarm for single magnet, or for average value of several magnets
- SWEEP mode; with settable reduced current levels, for scrap clean up without lifting the scrap container
- DRIBBLE (FANNING) modes, for controlled, partial material release
- Programmable output voltage level for full or partial voltage magnets. (For factory pre-programmed partial voltage levels, see **Controller Modifications, Form P**, page 2)

Other pre-programmed features are available. Reference Controller Modifications table or consult factory

RATINGS and FEATURES

Crane Applications:

Suitable for all AC supplied magnet cranes that handle scrap, plates, billets, or other ferrous products.

Temperature and Altitude ratings:

Controller is rated based on a 50°C external enclosure ambient, at altitude less than 3300ft (1000m). Where the site is above 1000m (3200ft), reduce the normal full load current rating by 1.0% for each additional 100m (320ft), up to a maximum altitude of 4000m (13,200ft).

Input Voltage:

With proper voltage code, standard units are suitable for use with line power from 380VAC or 480VAC (+/- 10%), 50 / 60HZ, 3Ø sources. For other system voltages, consult factory. Note that the actual AC load current is calculated to be approximately the DC Magnet cold current rating / 1.2; up to a maximum of 250A AC.

Output for Magnet Applications:

Voltage is programmable to all DC electromagnet applications, full or partial voltage, up to 550VDC (480VAC input) or 450VDC (380VAC input). Magnet cold current levels are programmable from 15A up to the maximum magnet rated cold current values

Disconnects:

The **MAGNIFIER^{AG}** has an externally operated molded case switch for local operation as a line disconnect. This disconnects all power and control in the enclosure except the incoming line connections at the Molded Case Switch, and the incoming power terminals in the connection compartment. Also included is a remote operated main contactor, which disconnects all magnet power, but leaves control power intact. (See Elementary Diagram).

Local codes and standards may also require a separate disconnect(s). For AC disconnects see page 9-10) for references to:

- **EuclidTM Bulletin 4245** AC Manual & Magnetic Disconnect Switches
- **EC&MTM Class 6440** AC Manual & Magnetic Disconnect Switches

Magnet Duty:

The control is rated for up to 100% on time. However, magnets are typically not 100% duty rated. Consult magnet manufacturer for allowable magnet duty rating. **Do not exceed the magnet on-time duty rating.**

Input Pilot Devices:

Standard magnet controllers can accept inputs from

- LIFT / DROP master switches, reference **EC&M Class 6815 Type MG1**, see page 7.
- Pushbuttons or selector switches (See Elementary Diagram)

RATINGS and FEATURES (Cont'd)

Protection:

- MAGNIFIER^{AG} controllers are self-protected from magnet short circuit, magnet open circuit under load, and power loss.
- Magnet temperature detect is based on the magnet rated (hot) resistance and current rating. For multi-magnet operation (**Form W1**) with several magnets in parallel, the magnet temperature protection will be based on the average temperature of all magnets connected.

OPERATING MODES

Standard Lift mode:

Upon LIFT command, the MAGNIFIER^{AG} system will apply a preset, elevated voltage for the fastest possible magnet charge. Upon attaining magnet cold current, operation continues as a voltage controlled system. Magnet holding voltage (ECONomy mode) is typically reduced to just enough to hold any lifted load without loss of material. ECO mode's voltage reduction minimizes magnet heat rise. However, the system may be set to any reduced holding voltage, up to a maximum equal to magnet rated voltage.

A consistent, initial cold current LIFT is applied for each operating cycle. Maximum attraction of material is attained before voltage reduction. The reduced voltage allows for reduced magnet heating. This ensures maximum lifted load at minimum energy expenditure with minimum magnet heating.

Standard Drop and Discharge Mode:

Upon DROP command, the MAGNIFIER^{AG} system will apply a preset, elevated reverse voltage for the fastest possible magnet discharge. Upon attaining the preset magnet reverse current consistent with clean drop, the system controls any residual energy; then returns to system ready-state (no current or voltage), ready for the next LIFT command.

Sweep Mode:

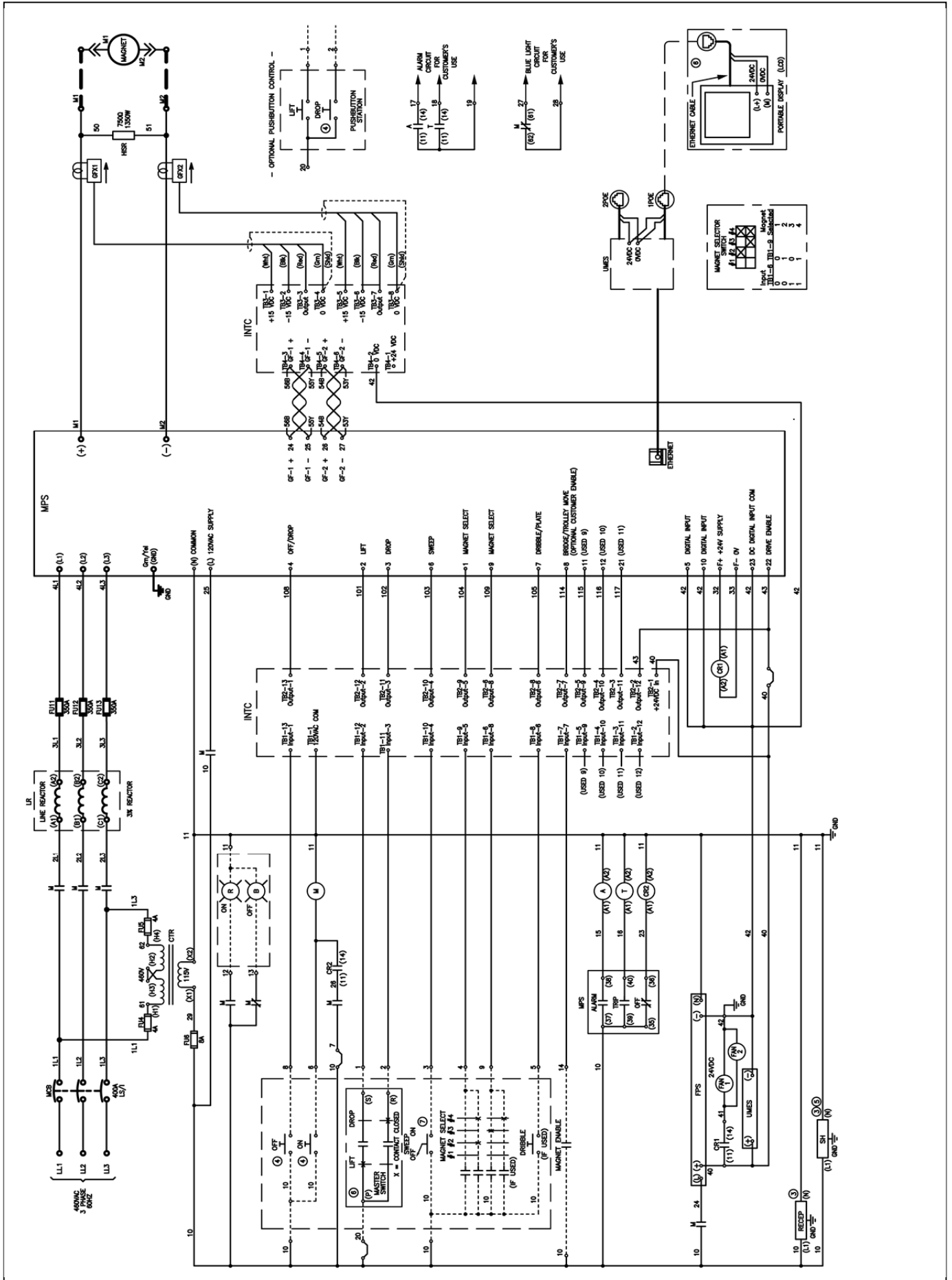
SWEEP Mode reduces voltage and current levels in the magnet to low, preset values. SWEEP values are field set and adjusted to remove ('clean') final pieces from a ferrous container without lifting the container. A selector switch or pushbutton input is required to activate the SWEEP power level. Standard SWEEP level is preset to 50% of magnet rated voltage, but SWEEP parameters are field adjustable below this level to fit the application.

Custom Drop / Dribble / Fanning Modes:

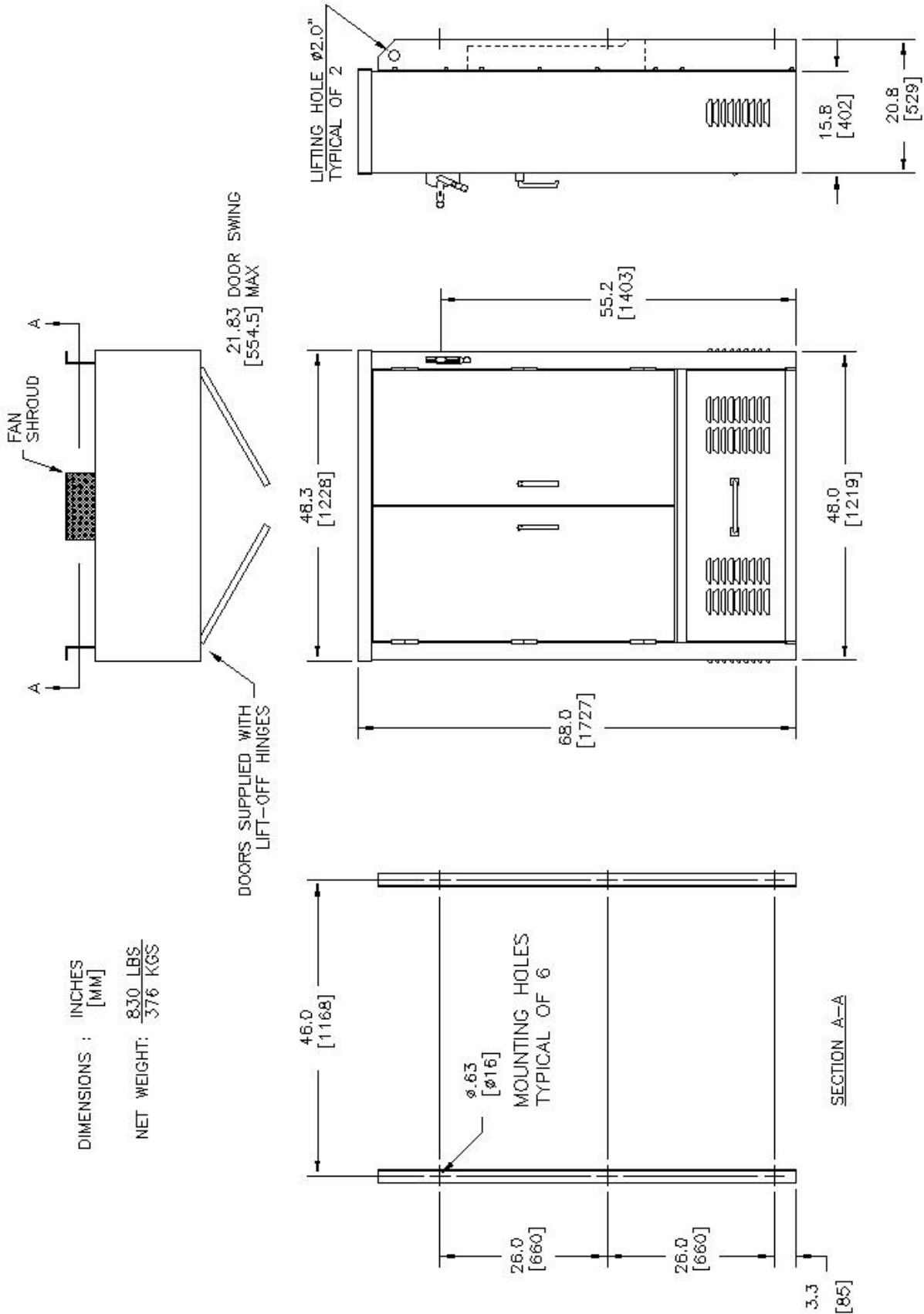
MAGNIFIER^{AG} controllers have several preset and custom release (DRIBBLE) modes available, which allow material to be released more quickly or slowly, as required. All modes require field adjustment for each material size and for each material composition. Available modes include:

- Slow release of scrap material, initiated by pushbutton or master switch input(s). These activate adjustable pre-set voltage ramps. Operator initiates ramp start, and material is released. Operator stops the ramp as needed, and will hold remaining material. Hold voltage levels may be automatically increased to ensure retention of remaining material through crane motion.
- Release of single sheet or billet. Upon release, Hold voltage levels may be automatically increased to ensure retention of remaining material through crane motion.

Bulletin 4805 ELEMENTARY DIAGRAM



Bulletin 4805 APPROXIMATE DIMENSIONS AND WEIGHTS



BULLETIN 4805 HUMAN-MACHINE INTERFACE (HMI) TOUCHSCREEN MONITORS

Bulletin 4805 Human-Machine Interface (HMI) Monitors are touch screens designed and programmed for access to all sizes of Bulletin 4805 **MAGNIFIERAG** magnet controls. The Bulletin 4805 Monitors provide access to:

- Magnet Parameter setup for up to four magnets
- Fault log, with time and date stamp
- Mode activation and setup for MAGNET selection, SWEEP, and DRIBBLE functions
- Running drive monitor capability

Bulletin 4805 Type HA2 Monitors are connected to the **MAGNIFIERAG** via Ethernet cables, either to the PoE (Power over Ethernet) port located on the front flange of the enclosure (1PoE, a temporary connection point for setup and troubleshooting), or internal to the enclosure (2PoE, a permanent connection point for a remote mounted 4805 HA2 unit). The maximum distance for remote PoE Ethernet cable connection is 200 ft. (60m). Cat5e or Cat6 Ethernet cables are required.

We offer the following HMI complete with a touch screen Interface, and appropriate Ethernet connections. HMI power is supplied from the Bulletin 4805 Magnet controller. External 24VDC power is not required for cable distances below 200ft (60m).

Bulletin 4805 Type HA2 Wall-Mounted Interface Monitor

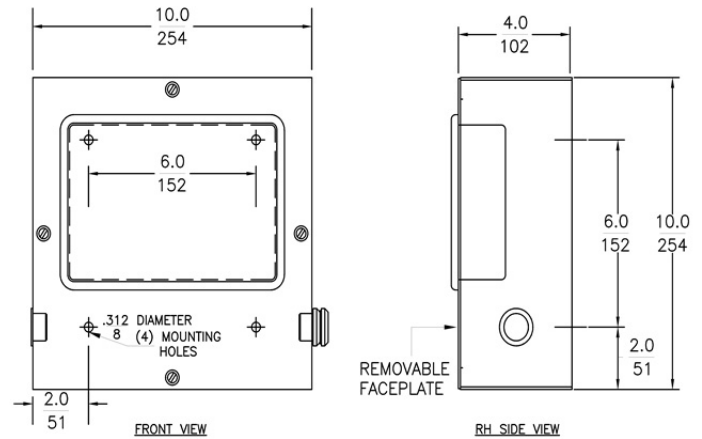


- For connection at the internal or external Ethernet ports (1POE / 2POE)
- Wall mounted, NEMA 1 gasketed enclosure for cab mounting

- External PoE Ethernet port, convertible into a conduit connection, if PoE Ethernet connections are to be made inside of the 4805 HA2 enclosure
- Ethernet port can be field located on either side of the 4805 HA2 enclosure

APPROXIMATE DIMENSIONS AND WEIGHTS

Dimensions: INCHES / mm
Bulletin 4805 Type HA2



Net Weight – 9Lbs (4kg)

MAGNET CONTROLLER PILOT DEVICES

Class 6815 master switches are designed for use with all magnet controllers

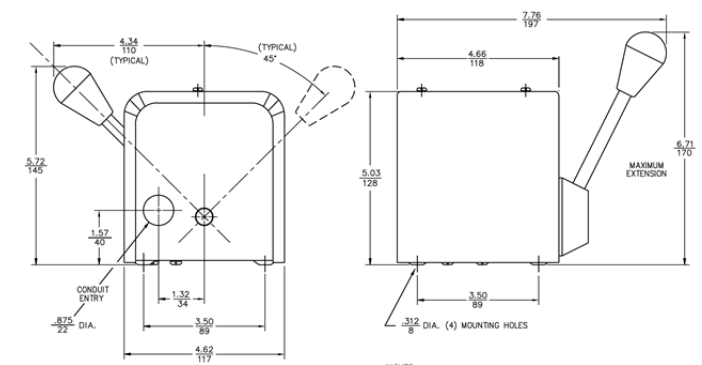


**Class 6815 Type MG1
Lever Type Lift-Drop Master Switch**

- NEMA 1 enclosure
- Double-pole overlapping contacts
- Horizontal or vertical mounting

APPROXIMATE DIMENSIONS AND WEIGHTS

Dimensions: INCHES / mm
Class 6815 Type MG1



Net Weight – 5Lbs (2.3 kg)

FOR PUSHBUTTON STATIONS, CONSULT FACTORY



PATENTED AC SUPPLIED MAGNIFIERAG vs. RECTIFIER SUPPLIED DC MAGNET CONTROL

System		MAGNIFIERAG ™	Rectifier Based DC Control
Crane Components		380VAC or 480VAC, 3Ø Power AC Disconnect MAGNIFIERAG Magnet Control Standard or partial voltage magnet	380VAC or 480VAC, 3Ø Power AC and / or DC Disconnect AC/ DC Power Transformer and Rectifier DC Magnet Control, electromechanical or Digital DC (solid-state) Standard magnets For Partial voltage magnets: Contactor controls require special rectifiers or special schemes Digital DC requires parameter setup for use
Energy Savings		Magnet discharge energy placed into AC line with very low voltage rise. Allows maximum power demand reduction. Transformer / rectifier power losses eliminated. No discharge / dump resistors or varistors used.	<u>Electromechanical (Contactor) or Digital DC (solid-state):</u> Transformer & rectifier power losses required Power demand reduction available for solid-state controls for the DC line only Losses in discharge resistors or varistors needed to limit discharge energy to the DC line
Magnet Performance and Operation	Magnet Charge & Discharge	Overvoltage with cutback allows fastest magnet charge and discharge available without special rectifier or special magnet.	<u>Electromechanical (Contactor) or Digital DC (solid-state):</u> Standard 230VDC rectified voltage systems, electromechanical or solid-state, take up to 7 times longer to charge and discharge Similar Overvoltage / Cutback available: Contactor controls and Digital DC require special voltage transformer / rectifier and / or special magnet control and / or special magne. Digital DC requires parameter setup for use
	Magnet Operation	Initial cold current on every lift without magnet overheating, for maximum lifted material. Voltage control after initial charge allows higher current when the magnet is cool, for maximum lifted material. As the magnet resistance increases during operation, magnet current is inherently reduced, protecting the magnet from overheating.	<u>Electromechanical (Contactor):</u> Lifting current limited by the magnet resistance change. Which leads to inconsistent operation. Initial lifting current reduced by 35-50% as the magnet reaches operating temperature <u>Digital DC (solid-state):</u> Magnet lifts can be set for cold current lifts, and with cutback current to avoid magnet overheating
	Sweep Mode	SWEEP mode selection allows next operation current reduction, for scrap cleanup of railcars, vessels, or other scrap containers without lifting the container.	<u>Electromechanical (Contactor):</u> SWEEP mode not available as standard <u>Digital DC (solid-state):</u> Sweep Mode available
Magnet Protection		Magnet temperature indication, with magnet resistance available via communications port and / or alarm relay. Three programmable levels of monitoring and protection for magnet overheating: <ul style="list-style-type: none"> • Response via alarm output • Current (lifting capacity) cutback upon next operation • Time delay of next lift command 	<u>Electromechanical (Contactor):</u> Magnet Temperature protection or indication is not available without special design <u>DC solid-state:</u> Magnet temperature alarm available via alarm relay and display
		Shorted magnet protection included.	Protection via (patented) magnet power supply and Line Fuses
		Discharge energy control during line power loss without resistors or varistors.	
Maintenance Savings		No routine contactor tip maintenance. One main line contactor required, with little maintenance required.	<u>Electromechanical (Contactor):</u> Contactor tip maintenance required. Power resistors required <u>DC Solid-State:</u> One main line contactor required, with little maintenance required Power resistors required



BULLETIN 4245 AC MANUAL MAGNETIC DISCONNECT SWITCHES
FOR LIFTING MAGNET CONTROLLERS AND CRANES
100 TO 2700 AMPERES

Manual Magnetic Disconnect Switches are used for protecting electrical crane circuits and AC sourced lifting magnet controls. The disconnect meets OSHA requirements for a crane magnet disconnect switch.

Application

AC Manual-magnetic disconnect switches are used to disconnect AC power from crane magnets, motors or other crane motor drives as a general isolation disconnect switch, or under loaded conditions in case of emergency.

When applied to Bulletin 4805 AC sourced magnet controls, AC continuous ampere rating in amps (at line volts, 3Ø) to be greater than or equal to the number equal to 0.83 x total DC magnet cold current applied.†

When applied as a crane disconnect, the continuous ampere rating of the disconnect switch shall not be less than 50 percent of the total rated current required by all motors on the crane, nor less than 75 percent of the rated motor current required by any single crane motion.†

Description

The Bulletin 4245 AC Manual-Magnetic Disconnect Switches are combination manually and magnetically operated contactors, enclosed in a NEMA Type 12 or 3R wall-mounted or floor-mounted enclosure.

- The disconnect switch operates as a remote mainline contactor with manual disconnect feature.
- All incoming connections are made to the front of the panel.
- Incoming line terminals are located at the top; Load terminals at the bottom.
- Control circuit connections are made at the side of the panel.



Features and Specifications

- Flange type operating handle provides positive “On” and “Off” switch position indication
- With the operating handle in the “On” position, the contactor coil circuit allows for remote operation of the three, normally open main power contacts
- Positive manual control for opening power contacts; and magnetic control for remote opening or closing of contacts.
- Provisions for three “Off” position padlocks
- Uses Bulletin 5110 Euclid™ AC magnetic contactors, silver-faced, for reliable continuous operation
- Auxiliary contacts allow for two indicating light circuits
- JIC Door interlock

NEMA Contactor Size	Continuous Ampere Rating†	Part Number for 240/480VAC‡	
		Enclosure*	
		NEMA Type 12 Dust tight	NEMA Type 3R Outdoor
3	100	HC4245000A0312301	HC4245000A033R301
4	150	HC4245000A0412301	HC4245000A043R301
5	300	HC4245000A0512301	HC4245000A053R301
5A†	400	HC4245000A5A12301	HC4245000A5A3R301
6	600	HC4245000A0612301	HC4245000A063R301
7	900	HC4245000A0712301	HC4245000A073R301
8	1350	HC4245000A0812301	HC4245000A083R301
77	1800	HC4245000A7712301	HC4245000A773R301
88	2700	HC4245000A8812301	HC4245000A883R301

‡380VAC and 575VAC disconnects available. Consult factory.

*NEMA Types 4 and 4X Stainless Steel cabinets available. Consult factory.

†Not a NEMA Size / Rating

Available Options: Power fuses Arc suppressors Pushbuttons / Indicating lights Additional Control relay

FOR MORE INFORMATION, SEE BULLETIN 4245 CATALOG or consult factory



**CLASS 6440 AC MANUAL MAGNETIC DISCONNECT SWITCHES
FOR LIFTING MAGNET CONTROLLERS AND CRANES
150 TO 1350 AMPERES**

The Manual Magnetic Disconnect Switch is used for protecting electrical crane circuits, and AC sourced lifting magnet controls. The disconnect meets OSHA requirements for a crane magnet disconnect switch.

The standard disconnect switch consists of:

- 3—EC&M Class 8503 Type M, Form Y781 (with silver faced power contact tips), SPNO Contactors.
The contactors are mechanically tied. One normally open and one normally closed electrical interlocks are included for indicating lights
- 1—Two pole Control Molded Case Switch with padlock clip (CMCS)
- 1—460/380/240 to 120V / 255V fused Control Circuit Transformer (CTR)
- 1—Intermediate Control Relay (CR)
- 1—Class 9999A11 Arc Suppressor



- CAM OPERATOR PREVENTS CONTACTORS FROM CLOSING WHEN HANDLE IS IN OFF POSITION
- CONTACTORS OPERATED REMOTELY OR BY HANDLE ON THE ENCLOSURE

Volts	NEMA Contactor Size	Continuous Ampere Rating	Enclosure	
			NEMA Type 1 Gasketed General Purpose	NEMA Type 12 Dust tight NEMA Type 3 Outdoor
			Type	Type
600VAC, Maximum ▼	4	150	MFS12	MFA12
	5	300	MGS12	MGA12
	6	600	MHS12	MHA12
	8	1350	MKS12	MKA12

VOLTAGE CODES ▼

Voltage Code	Incoming Line Voltage
V81	460VAC, 3Ø, 60HZ
V80	240VAC, 3Ø, 60HZ
V95	380VAC, 3Ø, 50HZ
V99	Special Incoming Line Voltage – consult factory

DISCONNECT MODIFICATIONS

Form	Description
F30	3 Main Line Power Fuses, Class L fuse mounting is standard. Customer to supply fuse rating.
A	START-STOP Push Button
X11	Additional Control Circuit Interlocks. A maximum of 4 N.O. / N.C. interlocks can be added.
A3	ON-OFF Pushbutton
P1	Red ON Pilot Light
P2	Green OFF Pilot Light
T12	200VA Additional Transformer capacity

DISCONNECT SWITCH SELECTION

When applied to Bulletin 4805 AC sourced magnet controls, AC continuous ampere rating in amps (at line volts, 3Ø) to be greater than or equal to the number equal to 0.83 x total DC magnet cold current applied.

When applied to cranes, the continuous ampere rating of the disconnect switch shall not be less than 50 percent of the total rated current required by all motors on the crane, nor less than 75 percent of the rated motor current required by any single crane motion.

ORDERING INFORMATION REQUIRED: 1. Class 2. Type 3. Voltage Code 4. Modifications: Specify Form number

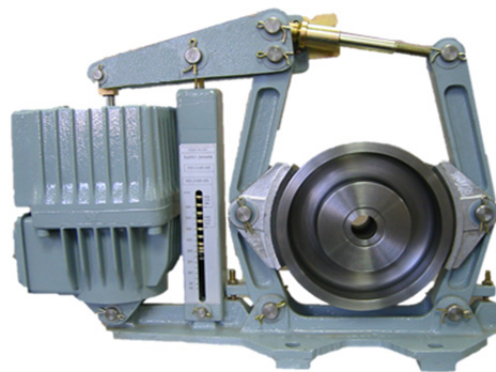
FOR MORE INFORMATION, REFERENCE CLASS 6440 CATALOG or consult factory



CRANE CONTROL SELECTION GUIDE

BULLETIN 4208 THRUSTER DRUM BRAKES

- AIST rated and suitable for all crane duty classes
- Spring set, electrically released, AC operated thruster type
- Hold drive stationary when motor is off
- Available in 8" to 30" wheel diameters
- AIST Torque ratings 100 through 9000 ftlbs
- Non- AIST Torque ratings 220 through 9000 ftlbs
- Thruster hydraulic fluid operating range (-20°C to +55°C)
- Standard with self-adjuster for 8" through 23" brake sizes
- Standard ground stainless steel pins on all brake sizes
- Self-lubricating bushings in all major pivot locations
- Optional extended temperature oil (-40°C to 107°C)



CLASS 5010 WB DRUM BRAKES

- AIST rated and suitable for all crane duty classes
- Spring set, electrically released, DC drum type
- Available for AC operation with brake rectifier controller
- Hold drive stationary when motor is off
- Available in 8" to 30" wheel diameters
- Torque ratings 100 through 9000 ft-lbs
- Corrosion resistant pins are standard on all brake sizes
- Grease fittings are standard on 19", 23" and 30" brake sizes
- Available with optional self-adjuster for 8" through 23" brake sizes



BULLETIN 4960 PROTORQ™ VARIABLE FREQUENCY CONTROL

- Stepped or stepless drives for wound rotor or squirrel cage motors
- Open loop travel and closed loop hoist drives available
- Crane specific software included
- Complete drive systems with torque proving, stationary auto tune, brake and power limit switch interface
- Rated 50°C as standard
- Software to monitor inputs, outputs, system logic, parameters, and drive power output as an oscilloscope trace
- Onboard diagnostics and fault history



CLASS 6420 to CLASS 6426 AC CONSTANT POTENTIAL (Contactor) CONTROLS

- Hoist drive styles include Eddy-Current Brake, Contra-Torque™, AC Dynamic Lowering, and Reversing Hoist controls
- Reversing Plugging control for bridge and trolley (travel) drives
- Rugged devices for extreme duty, control meets NEMA Service Classification I
- Available in NEMA contactor sizes 2 through 6, through 300HP for single or multiple motors
- Numerous modifications available
- Bulletin 8503 Type M LineARC™ contactors, with static timers, frequency relays for acceleration
- Industrial duty contactor versions available to meet NEMA Service Classification II



BULLETIN 4220 or CLASS 6170 YOUNGSTOWN™ HOIST POWER LIMIT SWITCHES

- Final safety limits for hoist upper travel
- Interrupts motor power directly
- Available ratings up to 500HP at 230VDC, or up to 400HP at 480VAC and 550VAC
- Available auxiliary contacts set to operate prior to main contacts, for variable frequency hoist applications



Please visit our website <https://www.hubbell.com/hubbellindustrialcontrols/en/> for additional details on:
AC & DC MILL DUTY CONTACTOR CONTROL, DC DISCONNECT SWITCHES, DC MAGNET CONTROL, DC REDUCED VOLTAGE STARTERS, MASTER SWITCHES, MILL DUTY RELAYS, OVERLOAD RELAYS, AC CONTACTORS, AND OTHER MILL DUTY CONTROL COMPONENTS

